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Are cognitive and social factors sufficient to explain the acceptance of decision aiding processes within organisations?

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***ARE COGNITIVE AND SOCIAL
FACTORS SUFFICIENT TO
EXPLAIN THE ACCEPTANCE
OF DECISION AIDING
PROCESSES WITHIN
ORGANISATIONS?***

A thesis submitted for the award of Doctor of Philosophy (PhD) through the Open University Business School

October 2001

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KEY WORDS

Decision Making, Decision Aids, Image Theory, Social Cognition.

ABSTRACT

This research extends the limited existing research into the acceptance of decision aids by considering this in an organisational, rather than personal, context. This led to the thesis having a theory-building bias as it was not clear at the outset what a decision aid in an organisation consists of, what the main influences on acceptance would be, nor how to conduct such an enquiry.

The potential influences were identified as the extent of agreement within the organisation with the way in which the decision aid represented the basic problem, and this was argued to form the *cognitive and social factors*. The expectation was to find an association between the level of intra-organisational agreement and either acceptance or rejection of the decision aid if they are the sole cause. Other potential influences include the type of problem (especially whether maintenance of the status-quo is an option), the approach to decision aiding in use, and other external factors.

Decision aiding in organisations was linked with approaches to organisational planning, whether or not this included significant use of IT. Such approaches involve constructing a problem representation and testing the implications of potential solutions. From this perspective, it was possible to see some of the influences on the acceptance of a decision aid as those which will affect any decision whether aided or not.

The empirical work was designed to disentangle these effects by concentrating on the degree of intra-organisational agreement and using case-studies to capture any other factors which applied.

The findings were that intra-organisational agreement, continuation of the status-quo and external constraints all influenced acceptance. However, there was no simple relationship between the cognitive and social factors and acceptance.

277 words

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CHAPTER ONE: INTRODUCTION

"... decision making takes place in the context of the perceptions of the people involved, their ways of understanding those perceptions .. and the power structure of the human organisation in which the decision is made" (Watson, 1992, p. 28).

1.1 Introduction

This thesis extends the limited amount of research, from a decision making perspective, into factors that influence the acceptance and use of decision aids. It also alters the perspective, usually taken to date, from how to aid individual decisions to considering factors that could influence the acceptance of decision aids in organisational settings. This shift had three main consequences. The first was to make this thesis an exercise in exploratory theory building. There was also a need to take account of the existence of multiple actors in determining acceptance and also just what makes up a decision aid in an organisation. These issues, not only had implications for the underlying theory but also in how to formulate a research strategy. The dynamics that resulted from seeking to achieve these goals form an important theme throughout the development of this thesis.

In terms of the existing research material, potentially relevant articles, by Rohrmann (1986), Brown and Vari (1992), and Watson (1992) concentrate on sketching an outline of the possible issues and then call for more research. Brown and Vari were particularly helpful as an indication of likely perspectives and approaches, but their research is limited to sketching out

issues and potential research methodologies. Research that considered the acceptance of decision support systems from an IT-perspective (eg Hollnagel, 1988; Elam and Leidner, 1995) has a different orientation and has tended to concentrate on how technical limitations restrict both the range of applications and their acceptance (Alter, 1992) rather than address individual or social factors. Other relevant material had the focus, traditional to decision research, of decision aids designed to help with individual choice (eg Timmermans and Vlek, 1992) and thus ignored the complications inherent in the organisational context.

Despite these limitations, the previous research did provide useful starting points. The particular value of Brown and Vari's (1992) article has already been mentioned. Another point of departure was Cook (1992), who identified that a decision aid in an organisation may be rejected if its problem representation does not match that of other users. This finding implied that a **valid research line** was to address how problem representations are formed, how they may then differ between individuals and then apply this to the acceptance of decision aids.

The logic of this led to a need to understand how individuals perceive both the nature and the value of the decision aid and how this representation influences intra-organisational agreement or disagreement with the decision aid. This meant having to clarify the extent of any agreement and how this could influence the acceptance of the aid. In addition, an important part of the research design was to test whether the relationship between agreement, disagreement and acceptance was a sufficient explanation or was the outcome tempered by other factors. This, in turn, implied a need to identify these other factors.

Chapter One

In combination, these issues confirmed the expectation of Brown and Vari (1992), that research into this area would need to take a multi disciplinary approach. In particular, there was a need to link research from individual decision making, for an understanding of how different individuals can create and sustain different representations of the same problem, to concepts more commonly found within social cognition research, especially that individuals represent external events in a subjective manner (Kelly, 1955; Weick, 1995) influenced by their experiences and current expertise. This is not to say that such concerns are unique to social cognition; they are also a feature of the aspects of decision making research described by Hammond (1996) as Correspondence Theories with their “emphasis ... on the flexibility of the organism in its adaptive efforts” (p. 63).

Two other areas, which are important to this research, came from the literature on organisational culture, in particular where this offers insights into the reasons for, and consequences of, different understandings of the organisational context. Since many decision aids also have an IT-element then it was natural that a link would also be made, not only to the literature on Decision Support Systems (DSS), but also to factors which might influence the acceptance of any IT-based system. In summary, at the outset there was a need to clarify:

Table 1:1 Central Focus of the Thesis

<p>Central Focus:</p> <p>to identify those factors that do influence the acceptance of decision aids</p> <p>Subsidiary Themes:</p> <p>to define:</p> <p>what is meant by the social and cognitive factors;</p> <p>what is meant by acceptance;</p> <p>what is meant by a decision aid.</p>
--

This agenda is central to the first three chapters of this thesis. Once a working understanding had been achieved, there was then a need to develop a suitable research methodology, conduct the empirical work and draw valid conclusions.

1.2 Outline of the Research Design

The basic **research design** reflected the need to undertake theory-building and to integrate individual and social factors in an organisational setting. The aim was to develop a workable model that identifies the main issues and starts to have some predictive value. This aim, combined with the need to encompass a theory-building element, and the implications of using a social cognitive approach, led to adopting a qualitative research design.

Such an approach is often used when too little is known of the domain to allow for an experimental design (Carroll and Johnson, 1990). However, qualitative approaches can be seen as valid in their own right. One example is that social cognition research, with its emphasis on

the social constructionist nature of knowledge, is inherently suspicious of the philosophical claims of empirical research of an abstract reality (Spender, 1998). Another dynamic, relevant in this instance, is the difficulty inherent in applying empirical approaches in organisational contexts (Bryman, 1989).

Working within the qualitative paradigm, this research was structured using case-studies. This allowed for sufficient investigations to be conducted until both a suitable methodology had been designed and tested and some indicative findings had emerged. The resultant findings were interpreted primarily using **pattern matching** (Yin, 1994). At its simplest this gives a means to compare the findings of a case-study with the predictions of a prior theory. In this research it was used to test which of two alternative models provided the best fit as an explanation for the reasons to accept or reject a decision aid.

These two models were divided into the **basic model** that assumed the *cognitive and social factors*, of the thesis title, were the sole cause of acceptance or rejection of a decision aid. This meant first identifying these as the extent to which the problem representation in the decision aid was shared within the organisation. From this, the expectation was of a relatively straightforward association between the level of reported agreement, either with the structure or its perceived validity, and the acceptance of the aid. The **alternative model** considered what other factors could be relevant and how, in turn, these would influence acceptance.

The research methodology adopted, in addition to the organisational context, is another way in

which this research moves away from the few studies of decision aid acceptance or validity conducted from a perspective based on decision research (eg Timmermans and Vlek, 1992). The qualitative design, used to deal with the organisational, and theory-building concerns, is a shift from the experimental empirical approach previously used in research into support for personal decision making (eg Humphreys and McFadden, 1980; Bronner and de Hoog, 1983; Timmermans and Vlek, 1992).

The next section concentrates on offering outline descriptions of some of the key terms and definitions used later in this thesis. Before this suggesting several issues that did not form part of the research design is useful. Given that the focus is the acceptance of decision aids there appeared to be no obvious reasons to seek out, or exclude, any type of decision situation. As a result neither organisational type, company size nor the distinction between private and public sector organisations formed any part of the choice of case-study. Also as this is not a study of why a decision aid was originally accepted, the focus in each individual case is the **current reasons** why an aid is accepted or rejected rather than the reasons why it was first adopted.

1.2.1 What is a decision aid?

A precondition to considering what factors may influence decision aid acceptance is the need to define just **what is meant by a decision aid**. Within the decision making literature, this is usually seen as support for individual decision making, with the aid being an explicit system (now usually IT based), which has some links to the tenets of decision theory (eg Timmermans

and Vlek, 1992). Cook (1992) weakened some of this attribution by identifying a decision aid as a discrete IT-based system which had a direct role in the subsequent decision but was more akin to a representative model of the problem rather than an application of decision theory. In practice even this definition proved to be too restrictive for describing decision support in an organisational setting. Instead a decision aid has been identified, following Rohrmann (1986), as any process that helps decision making. This was elaborated to include **Decision Support Systems (DSS)**, spreadsheet style **models**, or the wider **processes** by which an organisation supports its decision making.

The last of these can encompass planning routines, committees, interpersonal interaction as well as IT-based systems (Beach, 1996a). Such decision aiding processes place emphasis on how the decision maker comes to an understanding of the nature of the problem and thinks about the consequences of potential solutions. This aligns decision aiding with the process of supporting decision making through the construction of scenarios (van der Heijden, 1996) to explore the potential implications of a choice (Beach, 1990). However, such a liberal description of what forms a decision aid had important consequences as to whether it is then possible to distinguish between the aid and the decision process being supported.

This approach to defining decision aiding was of value as a means to describe the approaches encountered when conducting the case-studies. However, the broad definition proposed does imply several problems, as well as resolving some issues. As argued below one advantage to this conceptualisation is that it allows the usage of research lines into what leads to the

acceptance of any potential solution (whether or not it is aided). On the other hand the blurring between decision aiding and decision making had implications for the research design which were not satisfactorily resolved until the early theory-building cases were concluded. In effect, what should be the balance between concentrating on the decision making, as opposed to the decision aiding, process?

Nonetheless, such an approach to understanding the nature of organisational decision aiding was central to the development of the thesis. This assumption **equates aided with unaided decision making**. Reasons for acceptance then include how other members of an organisation evaluate the validity of a given problem representation or decision solution. Developing this, chapter two explores various reasons why the same problem may be represented differently and whether these differences follow any patterns in the organisation. This, in turn, forms a basis for understanding what the cognitive and social influences on acceptance might be.

1.2.2 Cognitive and Social Factors Influencing Acceptance

To answer the research question meant not just identifying potential factors that might influence acceptance of a decision aid, but also separating *the cognitive and social factors* from other potential influences such as the nature of the problem or external constraints on the organisation. In terms of the pattern matching approach suggested by Yin (1994) this forms the **basic model**. One important assumption, which enabled this to be done, started from arguing for a similarity between aided and unaided decision making. This assumption made it

possible to explore reasons for the acceptance of a decision aid using research into what influences the perceived **validity** of any proposed decision solution.

This argument was developed to make a distinction between generic factors which apply to all decision situations and those specific to the particular instance under investigation. Given that the focus of the thesis is what leads to the acceptance of decision aids, then the generic issues were seen to be the causes of agreement or disagreement between the decision makers' representation of the aid. This made use of the link between the concerns of decision making (problem formulation, solution generation, implementation and evaluation) and those of social cognition (patterns of agreement between individuals and how the individual represents external events) already mentioned. Mirroring this split, the generic factors were seen to be composed of **cognitive factors** (the way individuals conceptualise the decision situation and evaluate potential solutions), and **social factors** (the pattern of agreement and disagreement with a particular problem representation within the organisation).

For this thesis, the two core fields of decision making and social cognition were defined as:

- **decision making** is argued to encompass the process of problem representation and the testing of potential solutions. In doing this the decision maker makes use of past knowledge, and an assumption as to the importance of the decision, in determining how to deal with a particular issue. In both these respects, this differs from decision theory with its focus on the choice process and assumption that all decisions are made in the same way;
- **social cognition** is a large field with a variety of themes. In some respects it shares much with social psychology (Brown, 1986) but it can diverge in its interest in how the individual internalises and constructs external events (Augoustinos and Walker, 1995). Its usage in this thesis is particularly how the

individual uses prior experience to represent issues in the form of frames of reference (Beach, 1990) and how this influences intra-organisational agreement (Harris, 1994).

As already noted, it is the way in which different representations of a problem can affect acceptance that came to be seen as central to the thesis. One source of such differences maybe how closely the individual interacts with the problem and the linked decision aid. In this research, it proved possible to define four potential categories using the literature on individual differences in organisations (eg Daniels et al, 1994) and from the first phase of case-studies:

- those with the *technical knowledge* that forms the basic information set within the process (such as staff in finance, marketing, planning);
- those able to *set the overall conditions* within which the subsequent decision making will take place (for example senior managers);
- those who are *involved in the process but lack* some of the technical knowledge and influence. They may, however, have an appreciation of the implications of a given decision for their own particular area (these may typically be section heads and other middle managers);
- those who are *affected by the subsequent decision but are not really involved* in its making (other staff or managers whose functional interests are divorced from the particular decision being made).

If Daniels et al (1994) are correct then the individuals within these categories should agree as to the nature of the problem and the validity of the decision aid. Disagreements should increase as the distance between the groups widens and, as a result, their respective problem representations vary. This may be more or less important in determining acceptance depending on how the aid was designed and how contentious the particular decision is (Beach, 1990).

1.2.3 Other Factors Influencing Acceptance

The **alternative model** was developed from the idea that there might also be specific factors which could influence acceptance. Basically this argued that every decision situation has unique elements and that adding a decision aid redefines the overall environment. Thus the **type of problem**, especially whether it is new or ongoing, may have an influence (Rohrmann, 1986). In particular, once a given decision solution has started to be implemented, it acquires a degree of inertia that sees the decision makers persist despite conflicting evidence (Kerstholt and Raaijmakers, 1997). Equally, factors connected with the design and purpose of the **decision aid**, including the level of technology involved and whether it seeks to promote a particular problem representation or approach to decision making, may influence acceptance. Finally, **external pressures** on the organisation may have an effect, for example, leaving little choice but to adopt a given option or method of working despite internal misgivings.

These influences collectively form the **alternative model** and can be summarised as:

- if the status-quo is a valid option in terms of decision making, then inertia, convenience etc. will tend to reduce the effect of any differences. So a decision aid for an ongoing decision is more likely to be accepted despite misgivings than one for a new option (Beach, 1997);
- the decision aid itself may influence acceptance, in particular if the aid is highly technological, the motives behind it are distrusted, or if it attempts to make the decision maker act in a particular way (ie Decision Theory). If so it may increase the possibility of rejection.
- there may be issues connected with the unique set of circumstances surrounding the particular instance. From information gathered in conducting the case-studies, the most important of these might be the extent to which the organisation feels

constrained to a particular course of action by its external environment.

These specific factors may influence the **basic model** in several ways. The status-quo effect may minimise the importance of any differences which exist, while a decision aid that is based on a complex Artificial Intelligence approach may be more likely to be rejected merely because of its strangeness to the users (Agarwal and Prasad, 1998). Finally, external constraints may lead to a situation with little internal agreement as to the validity of the decision aiding process, but an acceptance that there is little choice but to act in a particular way.

One final way in which specific issues may influence acceptance is linked to the question of power in organisations (March, 1994). The **basic model** assumes that acceptance is linked to a shared problem representation, whilst adding the specific factors introduces some ambiguity into this (they might enhance or dampen the effect of such differences). However, what also needs to be considered is whether acceptance (in the sense of actual use) of a decision aid is more dependant on **who** agrees rather than the volume of agreement (Watson, 1992).

1.2.4 Defining Agreement, Acceptance and Usage

The debate about the usage of these words in this thesis is returned to in section 2.5.3. However, since clarifying what is meant by acceptance is important then this section offers a very brief discussion of what the term means in this thesis.

Chamber's dictionary (1979) offers the following formal definitions of these terms:

Chapter One

- **Acceptance**, “accepting; favourable reception”
- **Agreement**, “concord; conformity; harmony”
- **Usage**, “use; act or mode of using”

A consequence of these definitions is a need at this early stage to alert the reader to the slightly unusual use of the word acceptance in the thesis. In particular, it is shorn of any implication of a “favourable reception” and instead comes closer to the more utilitarian definition implied by usage.

1.3 Structure of the Thesis

The **first part** forms chapters two and three and is the theoretical elaboration of the thesis argument. To assist with this, chapter two reviews those articles which do exist on decision aid acceptance, and considers their implications. From the argument that decision aiding can be equated with the wider processes of problem solving, it then considers what lessons can be drawn from the literature on decision making and social cognition. Chapter three then used this research to construct both the **basic** and the **alternative** model. In effect, this forms a baseline for the interpretation of the empirical results.

The **second part** is chapter four, and this explores what type of research methodology would be suitable to answer the research question. The chapter considers previous work both from decision research and social cognition and argues that, given the nature of the research question, the appropriate solution is to base the research methodology on social cognitive

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approaches. Finally it considers how to do this in practice, reviewing various frameworks and the specific tools that are available to measure individual beliefs and agreement in an organisational setting.

The **third part** reports the empirical findings from the case-studies. This is divided between chapter five which reports the early theory-building cases and chapter six which covers the case-study conducted after the underlying theory and an appropriate methodology had been clarified.

Finally the last two chapters offer a summary and conclusion. Chapter seven reviews the lessons from the cases and the extent to which they support or disprove the hypotheses in chapter three. Chapter eight then considers the contribution, and limitations, of the thesis to the development of a theory of decision aid acceptance in organisations. It also reflects on other potential uses for the basic research design.

A summary of the basic structure and arguments of the thesis is sketched out overleaf (table 1:2). This table is designed to offer a simplified outline of the theoretical threads of the thesis and how they influenced the design of the empirical data collection.'

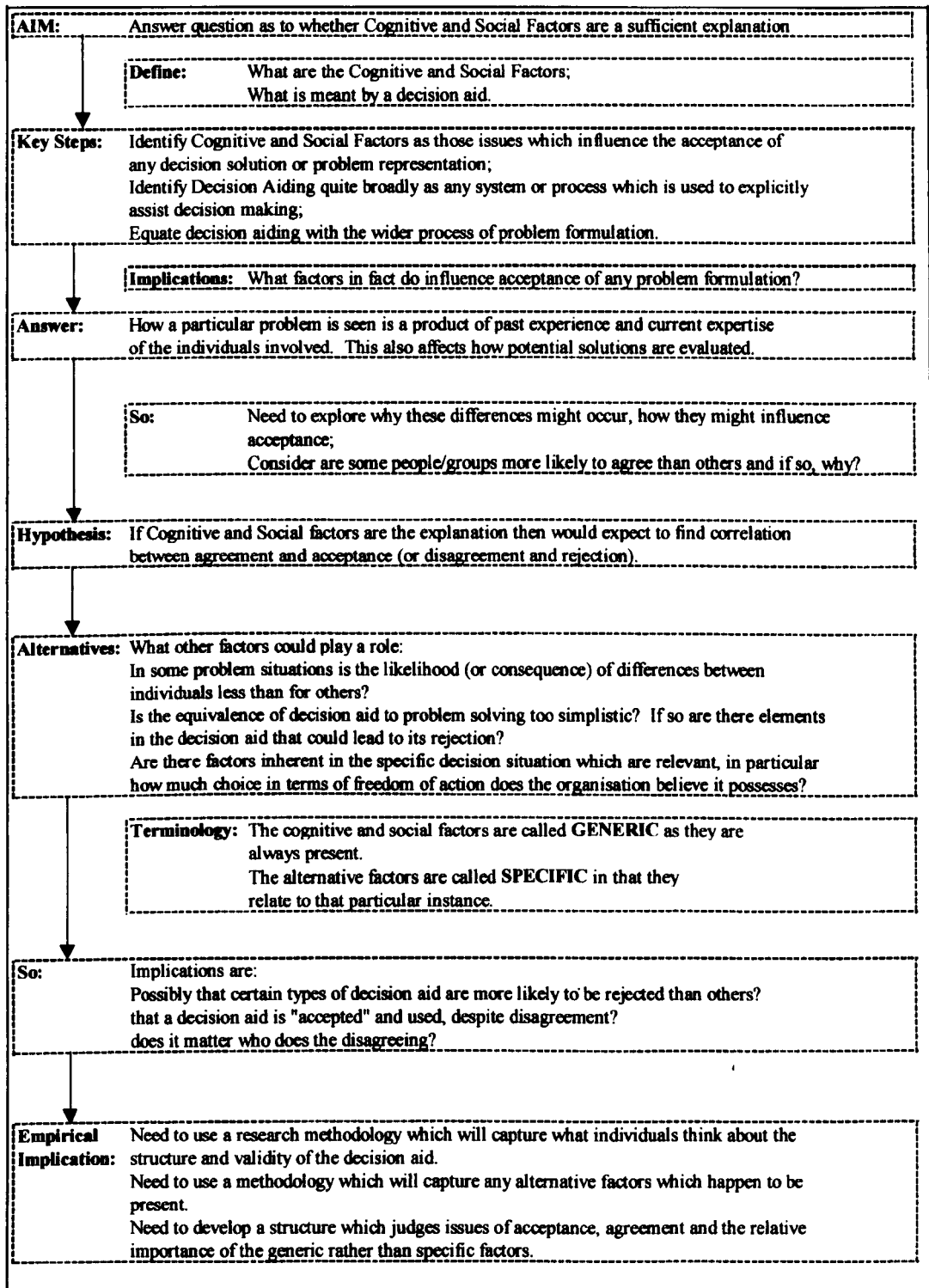
To help the reader, one route through the thesis is to compare the development of table 1:2 through a number of subsidiary tables. Table 3:4 on page 85 develops this to set out the empirical findings which confirm or reject the assumption that either the generic or specific

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factors have an influence on acceptance.

The methodology adopted to test these distinctions is summarised in table 4:8 (p.124) and the interim findings in the case-studies are listed in tables 5:6 (p. 149) and 6:6 (p. 191). These findings are summarised in table 7:2 (p. 200). Finally table 7:3 on page 207 offers a revised model which incorporates both the original theoretical expectations and the results of the empirical studies.

Table 1:2 Overall Structure of Thesis



CHAPTER TWO: BACKGROUND AND DEFINITIONS

"The idea of 'decision' can be elusive, of course. Defining what a decision is, when it is made, and who makes it have all, at times, turned out to be problematic" (March and Simon, 1993, p. 3)

2.1 Introduction

This chapter has its primary focus as the identification of issues which might influence the acceptance of a decision aid in an organisation. In doing so, it also seeks to elaborate just what is meant as a decision aid, especially in organisational settings. In effect, the chapter seeks to elaborate three of the four themes set out in table 1:1 (p. 4):

- What factors influence the acceptance of decision aids?
- What is meant by acceptance?
- What is a decision aid?

The principal aim of this chapter is to answer the first of these questions. In doing so it also starts to develop answers to the other concerns, especially the nature of a decision aid in an organisational setting, and what is meant in terms of acceptance. It also develops the basic argument set out in table 1:2 (p. 16). In turn, the division of the potential influences into the two models (briefly outlined in sections 1.2.2 and 1.2.3), used to test whether cognitive and social influences are a sufficient explanation of decision aid acceptance, forms chapter three.

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A variety of sources of information were used to identify potential influences. This reflects the theory-building nature of the thesis, its multi-disciplinary structure and the extent to which equating aided with unaided decision making is possible. To do this, the chapter starts with a review of the material on decision aid acceptance contained in the decision making literature, supplemented by information, as this is of a limited nature, drawn from research into the acceptance of IT-systems, management accounting models, approaches to planning and the process of strategy development. These are gathered in section 2.3 as the background material. Following on from this, section 2.4 explores the influences on the acceptance of any problem representation using the literature from decision making and social cognition. Finally section 2.5 returns to the question of how to define decision aids and acceptance and the similarities between decision aids and any other form of problem representation.

2.2 Why is this research important?

One reason for studying decision making is to improve decision making. A frequently cited means to achieve such improvements is to use some form of decision aid (Payne et al, 1993a).

This thesis reinforces the message that designers of a decision aid should not just seek to embed quantitative knowledge but also consider how the aid will fit within the organisational processes. In addition, at the very least, designers need to be aware of the likelihood of alternative representations of a given problem and that these will be an important determinant of the perceived validity of the aid, even if this dissent is not enough to stop its implementation.

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This research explores what these factors could be, even if it offers few solutions or reasons to believe that the difficulties can be easily addressed. Even so, this is useful given the level of resources often committed to IT-based Decision Support or Management Information Systems that fail to operate as originally envisaged (Rohrmann, 1986).

Overall, this research adds to the limited material that existed into the question of what underpins the acceptance or rejection of decision aids in organisational settings from a non-IT perspective. It also has value in that it reports another application of social cognition to the study of organisational behaviour (Huff, 1997). In particular, it extends this beyond a concern with strategy formulation and concepts of competitive environments (Hodgkinson, 1997) to the issue of decision making in organisations.

Generalising from the research findings also was possible. One such direction was to consider whether this approach could be applied to specific developments in management accounting for decision making (Cropper and Cook, 2000). Some of the research on the acceptance of Activity Based Costing (ABC) is drawn on to form the basic model but it is also possible to use the findings of this thesis as one way of exploring reasons why such approaches may fail to be accepted. Another direction is to abandon the focus on the acceptance of decision aids and instead see a development of the research into the broader question of the influences on intra-organisational agreement and the effect on decision making in organisations.

2.3 Background Material

As already noted, a major dynamic in the structure of this thesis has been the relative paucity of previous research. This is particularly relevant as what little has been published in the decision making literature has tended to concentrate on support for personal decision making (eg Bronner and de Hoog, 1983; Timmermans and Vlek, 1992; 1994) rather than the acceptance of decision aids in organisational settings. The few articles from a decision making perspective (eg Rohrmann, 1986; Brown and Vari, 1992), which address the organisational dimension, have limited themselves to identifying potential research lines rather than reporting already conducted studies. These articles are reviewed in section 2.3.1.

Overall, the dearth of prior research was less of a liability than originally feared. Not only does valuable material exist in related areas such as IT-implementation and support for organisational planning processes (section 2.3.2), but also many reasons for the acceptance of decision aids can be drawn from mainstream research into the decision making process (section 2.4.1). An aided decision still needs to go through the process of problem identification, solution generation and evaluation of potential solutions. This process is common to any decision situation and differences of opinion between individuals can occur as to the nature of the problem and the validity of a solution.

2.3.1 Articles on the Acceptance of Decision Aids

This section reviews, in detail, four articles (Rohrmann, 1986; Brown and Vari, 1992; Timmermans and Vlek, 1992; Watson, 1992), which called for research into the reasons for the acceptance or otherwise of decision aids from a decision making perspective. Collectively they provided the starting point for this thesis, especially when combined with the findings reported by Cook (1992).

Rohrmann (1986) argues that the various claims that decision aids actually do help the decision maker have not been exposed to scrutiny. He suggests this is important for five reasons:

- that using a *decision aid consumes resources*;
- that many are founded on *decision theory* and there is no proof that using this leads to any improvement in decision making;
- that little is known *about when decision aids are appropriate* "according to characteristics of clients, attributes of problems and the individual and social context" (p. 364);
- how can the most *appropriate decision aid be selected for a given problem*;
- *decision aids are complex* so the reasons for their success or failure may be rooted in several causes.

He argues that reasons for the limited research include lack of interest, lack of awareness of the potential usefulness of decision aids or that constructing such a study is too difficult on methodological grounds. Direct evaluation, in particular, is complex as it implies a need to measure decision quality. To overcome this, he suggests conducting a series of evaluation studies that should either focus on outcomes (was the desired aim achieved) or process (to see

why a given aid may or may not have been successful). In methodological terms his proposal is for a series of quasi-experiments that use longitudinal studies to measure success against pre-agreed outcomes with control groups to differentiate between intended and unintended results.

However, the methodological approach was seen as of little value for this thesis, partly because Rohrmann concentrates on how to evaluate effectiveness whilst this research is concerned with reasons for acceptance. A larger issue is that Rohrmann's proposed research design fails to match the fairly liberal definition of a decision aid he advances. In effect, such a study could only work when the individuals explicitly identify what they are doing as decision aiding, while frequently what forms decision support in organisations is more diffuse (this argument is developed below in section 2.5.1).

Brown and Vari (1992) identify a mismatch between the theory used to develop many decision aids (usually decision theory) and the emerging findings of behavioural decision making, which would suggest a different approach to their design and implementation. In effect, they argue that existing decision aids are grounded in prescriptive decision science and this limits their applications to certain types of problem whilst their acceptance is influenced by the perception of the validity of decision theory approaches by the decision makers.

To widen the base of decision aids from choice to problem structuring, and to consider when specific types of aid are appropriate for particular problems, they suggest using one of three research approaches:

- *build-test-build-test*, adapting the traditional engineering paradigm with a high degree of realism built into the test process rather than using "convenient experiments involving students ... and contrived situations" (p. 39). This was the approach used by Cook (1992);
- *aid-orientated behavioural research*, suggests adapting the traditional research paradigm within cognitive psychology to look at the interaction of subject and aid in an experimental setting;
- *field research*, is seen as a promising approach that can be conducted using either *surveys or intensive case-studies*. These could focus on establishing when aids are needed, evaluating current instances of decision aids or "identifying obstacles to successful use of decision aids" (p. 40).

In summary they conclude "we have suggested what seem to us to be promising tracks to pursue" (p. 42) and that initially such research will be multi-disciplinary and lead to broad tentative findings. This article was of **greater value in underpinning this thesis** than that by Rohrmann. It is clearer as to the organisational dimension of such research and acknowledges that the empirical work may not be best conducted within the experimental paradigm but instead could gain from adopting qualitative case-study techniques.

Watson (1992) concentrates on the theme of what type of theory is the most appropriate for designing a decision aid. He sketches out what aids would look like if they were based on several behavioural theories of decision making rather than the traditional approach of using decision theory. In summary, he suggests adopting a pragmatic approach to the design of decision aids with a preference to those based on methodologies being developed by proponents of soft organisational research (Pidd, 1996), such as Checkland and Scholes (1990) or Eden (1991). He concludes by arguing that different types of decision aids should be developed for different situations and there is no value to a universal approach to decision aiding. The article is relatively light concerning methodological issues and its main value to this

thesis was its identification of how the nature of the decision aid could be a limit to its own acceptance.

Timmermans and Vlek (1992) identify the factors that limited the acceptance of a decision aid based on the principles of Multi-Attribute Utility Decomposition (Edwards and Newman, 1982). In part, this experimental study forms a follow-up to the earlier work of Bronner and de Hoog (1983), and they retain a focus on the individual decision maker making personal decisions in an experimental setting. As a result, they make several suggestions that could improve the design and applicability of decision aids.

Finally, **Cook (1992)** reported on the results of a quasi-experiment designed to test how using a decision aid could improve decision making. Here a simple spreadsheet based model was constructed to help with the process of costing academic programmes. It was tested with five individuals in the same organisation and rejected as a valid basis on which subsequent decisions could be made by four out of the five. The reason given was the failure of the aid to represent the problem in a way with which the individual agreed.

These articles help to address some of the questions identified in table 1:1 (p. 4), repeated at the start of this chapter. In particular, they suggest that the **nature of the aid, especially if it is based on decision theory, can be a limitation to its own acceptance**. Other potential factors appear to include concerns with both the validity of the basic decision making approach, or the problem representation, embedded in the structure of the aid. Both Rohrmann and

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Brown and Vari start to indicate other influences on acceptance, in particular the nature of the decision, dynamics within the organisation and the preferences of individual decision makers.

Finally they start the process of defining what is meant by a decision aid. Rohrmann suggests this is not merely the support for the choice process implicit within decision theory but instead is anything that actually helps decision making. Cook starts the debate that there can be an effective gap between the decision aid and subsequent decision making. One other issue, identified by both Brown and Vari and Watson, is whether the need is for decision aids for specific problems or for decision aids that assume that all decisions are made the same way.

2.3.2 Related Prior Research

Besides the material on decision aid acceptance from a decision making perspective, it proved useful to consider related areas to see if relevant material existed. All these can be characterised as forms of decision aids (section 2.5.1) so the reasons for their acceptance or rejection can be valuable in identifying causes that may apply more generally.

One source, given the IT-base of many decision aids, has been material on the **adoption of IT** itself. Others included the **adoption of a new accounting technique** - Activity Based Costing (Cropper and Drury, 1996), the **use of models** in the policy process (Dutton and Kraemer, 1985) and the **role of planning** in organisations (Mintzberg, 1994; van der Heijden, 1996).

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All these aspects can be seen as part of the way in which **strategy development** (Bailey and Johnson, 1992; Falkenberg, 1993) is supported in organisations. Whatever view is taken of the actual process (Schoemaker, 1993; Løwendahl and Øivind, 1996) the envisaged support environment is rarely purely numerical (Moormann and Lochte-Holtgreven, 1993; Boland et al, 1995) and instead consists of a process sometimes described as forecasting (Jungermann, 1985; Beach et al, 1996a). In this view the decision maker needs assistance to construct an understanding of the problem and the consequences of potential solutions and will use committees, planning groups and informal meetings to achieve this.

Material can also be drawn from prior research into reasons for the **acceptance of Decision Support Systems (DSS)**. These identify the extent to which moving to an IT environment (or changing the existing one) is too large a leap (Agarwal and Prasad, 1998), leading to rejection because the subsequent work environment is alien. An alternative, but unsatisfactory, explanation is to point to a mismatch between the decision maker's style and the decision support environment (Elam and Leidner, 1995). They take a mechanistic approach, and ascribe an invariant decision style to the individual that is in direct contradiction to much recent research into decision making (eg Payne et al, 1993a; March, 1994). It is, nonetheless, valuable because the argument could be restructured as saying that the decision maker is unhappy with the problem representation embedded in the aid. Such a formulation supports the argument that one reason for rejection is the failure of a decision aid to represent the problem in a manner acceptable to individuals in the organisation.

These different literature strands are summarised in table 2:1 (below). This identified a number of articles either written from a decision making perspective or consulted as part of a wider literature search for potential reasons for the acceptance of decision aids. Table 2:1 sets out such articles in alphabetical order, divides them roughly into one of five fields of study (accounting, decision making, IT, modelling or planning) and identifies the style of research enquiry. Finally it summarises the main findings of each article and three main themes can be discerned:

- *that the nature of the problem representation in the decision is unacceptable*, (Dutton and Kraemer, 1986; Timmermans and Vlek, 1992), this is sometimes refined to noting a split between those close to the aid (accountants or planners) and generalist managers within the organisation (Mintzberg, 1994). This may also show as lack of support at senior levels of the organisation for the desired changes (Friedman and Lyne, 1998);
- *that there are limitations in the type of problem for which formal decision aids can be used*, because of difficulties in creating decision aids that can help with ill-structured problems (Kersten and Mallory, 1989; Boland et al, 1995). Also technical and cost constraints may make adopting a new work approach unacceptable (Hinton and Kaye, 1996);
- *that the theory used to underpin the decision aid is inappropriate*, in particular there is no reason that decision aids should be based on decision theory, instead aiming to be valid representations of the particular problem without any particular decision making approach being used might be preferable for them (Rohrmann, 1986; Brown and Vari, 1992; Watson, 1992).

Table 2:1 Previous Research in Related Fields

Author (s)	Date	Field	Type	Main Themes
Agarwal and Prasad	1998	IT	Case-Study	Problems may relate to the extent to which the technology environment is too alien, it needs to reflect current work practices if it is to be acceptable
Alter	1992	IT	Exploratory	Current concerns in DSS literature too focussed on technical issues rather than assisting the decision maker
Asch and Kaye	1989	Accounting	Techniques	problem of over-simplification within a given model and also that not all relationships are amenable to mathematical modelling
Boland et al	1995	IT	Review	Mismatch between the type of problem seen as suitable for formal decision support and the environment offered in many DSS, result is that few DSS help with ill-structured decisions
Bronner and de Hoog	1983	Dec Making	Experiment	formal decision aids only accepted for certain types of problems, not too trivial, not too complex
Brown and Vari	1992	Dec Making	Exploratory	problem of basing decision aids on decision theory, is there an alternative theoretical underpinning?
Cobb et al	1992	Accounting	Review	Review of various problems with ABC including how to make its embedded assumptions clear to non-technical users
Cook	1992	Dec Making	Experiment	Aid rejected because its problem representation is not that of the users
Cropper	1995	Accounting	Survey	Various reasons for lack of acceptance of ABC include lack of time, lack of perceived value and difficulty in convincing non-technical managers as to its value, also fears as to what agenda lies behind its implementation as it is often associated with costs
Dutton and Kraemer	1985	Modelling	Case-Study	Difficulty with how the problem has been represented in the support environment, that the modellers may wish to use the decision aid to push own agendas
Edam and Leidner	1995	IT	Exploratory	Mismatch between decision makers preferred "style" and that offered within the Decision Support System
Feldman and March	1981	Dec Making	Case-Study	Formal decision support has not been successful in aiding ill-structured decisions
Friedman and Lyne	1998	Accounting	Case-Study	resistance from both accountants and general managers, lack of expertise, complexity of the process, lack of a "champion", approach not fully accepted within the organisation
Hinton and Kaye	1996	IT	Review	Cost and adaption problems as barrier to implementing IT solutions
Hollnagel	1988	IT	Case-Study	Limitations are technical and will be solved once improved hardware and software is available
Kersten and Mallory	1989	IT	Exploratory	How decision aids can be designed to assist with ill-structured problems
Mintzberg	1994	Planning	Review	reasons for failure of the planning process include separation (physical and mental) of planners and managers, that the process fails to capture the complexities of the organisation
Rohrmann	1986	Dec Making	Exploratory	Need to look at interactions of problem, individual and social context to understand why decision aids may not be acceptable
Timmermans and Vlek	1992	Dec Making	Exploratory	Difficulty with how the problem has been represented in the support environment
Watson	1992	Dec Making	Exploratory	problem of basing decision aids on decision theory, is there an alternative theoretical underpinning?

In summary, prior research into decision aid acceptance has identified several themes developed in the rest of this chapter. It confirms the likelihood that differing problem representations are one potential cause (for example, Timmermans and Vlek, 1992 and Mintzberg, 1994) of rejection. This could be more marked in situations where the decision aid is either based on decision theory (Watson, 1992) or technically complex in IT terms (Agarwal and Prasad, 1998) leading to a decision support environment divorced from the decision makers expectations (Boland et al, 1995). Section 2.4 concentrates on how recent research into decision making and social cognition can explain these conclusions.

Overall section 2.3.2 supports the developments of table 1:1 identified at the end of section 2.3.1. Important influences on the acceptance of a decision aid can include the nature of the aid itself, its assumption of the decision making process and the extent to which the problem representation within the aid is shared by its potential users. Finally it supports the view that a decision aid is less narrowly defined in an organisational setting than it might be when considering decision support for personal decisions. An important subset of this is that the aid might be slightly divorced from the decision in that it provides information on which a subsequent choice is made, rather than directly informing the nature of that choice.

2.4 Other Relevant Material

This section draws out material that both supports and extends the conclusions above, specifically using literature on decision making (section 2.4.1) and social cognition (section

2.4.2). This material is then used to elaborate table 1:1 (p. 4), using the argument that what affects agreement or disagreement with any potential decision solution will also affect an aided decision. Thus the focus of this review of decision making and social cognition literature is those theories which discuss either the reasons for differences of opinions, or the consequences of these differences for acceptance and implementation. In the context of table 1:2 (p. 16), these sections flesh out the concerns as to why “*differences might occur, how they might influence acceptance*” and consider “*are some people/groups more likely to agree than others and, if so, why?*” The main purpose is to provide further empirical underpinning for the conclusions reached at the end of section 2.3.

2.4.1 Issues in Decision Making

This section has several goals. At its simplest it outlines the nature of decision theory and several recent alternative approaches to describing decision behaviour (section 2.4.1.1). This follows up the issue already identified, particularly in section 2.3.1, that aids based on decision theory are likely to be rejected because such an environment is unacceptable to the users. Alternative theories of decision making tend to stress how the decision maker adapts their behaviour in relation to the nature of the task, their experiences and their perception of the importance of the decision.

These lessons are then developed in section 2.4.1.2 to consider why problem representations may vary. Section 2.4.1.3 explores both how the evaluation rules may vary and the

implications of this for the acceptance of a given decision solution. These themes are then elaborated in section 2.4.2 using material from social cognition research.

2.4.1.1 Decision Theory and Recent Alternatives

March and Simon (1993) suggest that defining decision making is not straightforward.

Svenson (1990), for example, identifies a continuum from decision making as the active application of a conscious series of steps to automatic actions involving little or no active consideration.

Theories of decision making originated from seeking to prescribe how individuals should make choices if they were to fit the rational choice model of classical economics (Simon, 1955; Koutsoyiannis, 1979). This evolved into **decision theory** that can be characterised (eg Humphreys and McFadden, 1980; von Winterfeldt and Edwards, 1986) as seeking to help decision makers to make choices by selecting the most appropriate of several options. The main features are:

- usage of numerical and statistical rules to choose between options involving some combination of likelihood and desirability;
- a focus on the choice phase of decision making;
- an assumption that the problem is well enough understood to be represented and that sufficient is known about the potential solutions to compare them.

The key decision rule within decision theory is some variant of Subjective Expected Utility (SEU) which allows a decision maker to rank alternatives as to their desirability and

probability. Both these criteria are subjectively interpreted by the decision maker.

A significant body of research now exists (eg Simon, 1955; 1961; Kahneman and Tversky, 1984; Eiser and van der Pligt, 1988) suggesting that people do not use decision theory for reasons of cognitive limitations (Simon, 1981) and/or lack of calculative skills (Granger-Morgan and Henrion, 1990; Sokol and McCloskey, 1991). Huber et al (1997) found little use of probabilities in evaluating choice options, especially when the information available to the decision maker was limited. Finally decision makers maybe unwilling to accept the recommendations of decision theory as this would mean accepting that their own decision routines are flawed (Eiser and van der Pligt, 1988), or that decision theory offers a superior route to more intuitive procedures (Simon, 1983; Klein, 1998). Overall, **decision theory is usually now seen as an inadequate description of the decision process.**

One trend in the move to reject decision theory as a valid description of decision behaviour has been to stress the importance of problem structuring and representation (considered in more detail in section 2.4.1.2 below). Another central assumption of decision theory that has been challenged is that all decisions are made in the same way. There are currently several lines of research that stress the different ways in which individuals may **adapt** their decision making to the demands of the task in hand. Hammond (1996), described these collectively as **Correspondence Theories.**

One unifying theme is that they all, to some extent, rely on a cost-benefit approach to decision

making with solution routines varying from involving significant levels of mental effort (Simon, 1979) to the essentially intuitive and automatic (Klein, 1998) depending on the importance the decision maker ascribes to the particular task. Another similarity is that many of these theories believe the decision maker uses (or adapts) an existing strategy to both recognise and resolve the decision. A weakness is that they are less clear about how these strategies, in turn, are chosen. For example, Beach (1997) abandons his earlier position that the process of choice between strategies uses a variant of Subjective Expected Utility (Beach, 1990), without then suggesting how this is carried out.

The theories include that of an *Adaptive Decision Maker* (Payne et al, 1993a) who balances task importance, availability of solution and resources before adopting a method to solve the decision. Maule (eg Maule and Edland, 1997) developed *Variable State Activation Theory* that works from the premise that how individuals cope with stress in decision making (eg from time-pressures) is also adaptive, with different cognitive strategies involving varying degrees of mental effort and engagement with the problem adopted according to the individual's perception of the situation. Svenson (eg Verplanken and Svenson, 1997) has described what he calls a *Differentiation and Consolidation Theory* that links the perceived importance of a given decision to the subsequent effort used to solve it. He also argues that once a choice has been made the decision maker will reframe the problem representation to maximise the attractiveness of this option as opposed to its alternatives. This will lead to this particular solution being sustained despite subsequent negative evidence. Beach's *Image Theory* is discussed in more detail in section 2.4.1.3.

The **overall implication** is that decision making is a process of adapting between known solution options and the demands of the situation, with an attempt to match solution routines to the type of problem (Svenson, 1990). Payne et al (1993a) and Beach (1990) argue that the decision maker has a repertoire of previously learnt strategies that they seek to use in new situations. They may accept a mismatch if the problem is too trivial to invest much effort in, or they are confident in their ability to generate an acceptable outcome. This optimism may be ill-placed under conditions of stress (Reason, 1990), when dealing with a new task or where time constraints can lead to the progressive elimination of options (Payne et al, 1993a). This can be especially marked in new situations where the decision maker's perception of the situation may be flawed (Payne et al, 1992; Johnson et al, 1993).

2.4.1.2 Reasons for Different Problem Representations

Besides stressing how decision behaviour is adaptive to the task in hand, many of the new theories of decision behaviour blur the distinction between problem solving and decision making. A difference can be drawn between those who equate decision making with problem solving (Huber, 1989), and those who argue these are two separate and distinct activities (MacCrimmon and Taylor, 1976). For example, MacCrimmon and Taylor (1976) argue that "problem solving deals primarily with simple situations that often have correct solutions, while decision making encompasses broader, more important criteria" (p. 1398). Huber (1985) on the other hand, argues that "parts of the decision process ... are clearly problem solving processes" (p. 109) and, in consequence, decision making is one of several types of problem

solving behaviour. Beach (1990) suggests that a compromise is to see problem formulation and solving as an initial stage in a decision making process (Payne et al, 1978) that may sometimes lead to a need to choose between options.

The process of problem solving can be artificially divided into **recognition, formulation and resolution**. The key items are how individuals use their experiences to form an initial problem recognition (even to the extent of accepting if there is a problem) and that once formed these representations are relatively unresponsive to new information. These issues recur throughout the rest of this chapter and form an important part of the model of decision aid acceptance developed in chapter three.

Table 2:2 Key Elements in Problem Formulation

Stages:	Constraints:
Recognition:	How do you become aware you have a problem? - external stimuli, previous experiences may lead to recognition.
Formulation:	How to you understand the nature of the problem? - construct causal links between known data using available clues, influenced by previous knowledge and beliefs.
Resolution:	Generate possible solution that fits problem as recognised and formulated and is compatible with organisational or personal goals.

Problem recognition is described by Von Winterfeldt and Edwards (1986) as "identifying the unscratched itch" (p. 31). The process of problem recognition is influenced by how prior knowledge of the individuals allows them to filter information and to interpret clues (Cohen et

al, 1972; Baddeley, 1986). In consequence, "the beliefs of the solver may and usually do play a critical role in the process of interpretation" (Voss et al, 1991, p. 122), and how a problem is first recognised and initially represented will significantly influence how it is subsequently developed and what solutions appear to be available (Simon, 1979; Klein, 1998).

However, not only is the process of problem solving filtered by different experiences but the process of representation and interpretation maybe flawed due to the difficulty in recognising causal links between the known factors. One reason is that "in searching for a link between cause and effect, most people usually look first to some unusual or remarkable event that preceded the effect" (Einhorn and Hogarth, 1987, p. 66). Due to this, responsibility is often ascribed to the most recent prior event (Funke, 1991). Other research (Teigen et al, 1996), has found that there are difficulties in constructing causal chains even without the added problem of delayed feedback.

In effect, how a problem is first seen is an important determinant of how it is subsequently represented and this initial understanding may be flawed. Due to these dynamics, different **problem formulations** may be a product of the relative expertise held by the individuals.

Wagner (1991) suggests that the initial tendency in managerial decision making is to look for a ready made or easily adapted solution to a problem. A particular reason for different representations maybe the differing knowledge bases of experts as opposed to novices in the particular field (Voss et al, 1991). Klein (1998) argues that it is precisely this that allows quick decision making under conditions of stress or with minimal information while such overall

knowledge may help in interpreting complex or ambiguous clues (Gick, 1980; Funke, 1991).

However, previous experience is not always positive as an expert may generate a rich picture but be constrained by their pre-held beliefs and organisational function (Allison, 1971; Grønhaug and Falkenberg, 1998). This may particularly occur "when an expert's procedural knowledge doesn't really map onto the problem setting" (Rosman et al, 1994, p. 1018). This tendency to fit the current event to past beliefs may affect situation recognition or be manifested in a preference for a particular approach to, for example, the process of managing change (Lindell et al, 1998), which they will seek to promote despite the situation (Hellgrun and Löwstadt, 1998).

In summary, the main reasons for differences in problem representation are:

- *that different problem representations can result from the different previous experiences of the individuals.* Another reason for this, is a tendency to construct a problem in the same way as when it was previously encountered;
- *difficulties in constructing causal chains* may lead to incorrect initial assessments as to the nature of the problem, in turn this will place greater emphasis on experience as a determinant of problem representation;
- *prior expertise may help speed the problem recognition process, but may also lead to trying to fit a new problem onto a pre-learnt pattern or solution strategy.*

2.4.1.3 Reasons for Different Solution Criteria: Image Theory

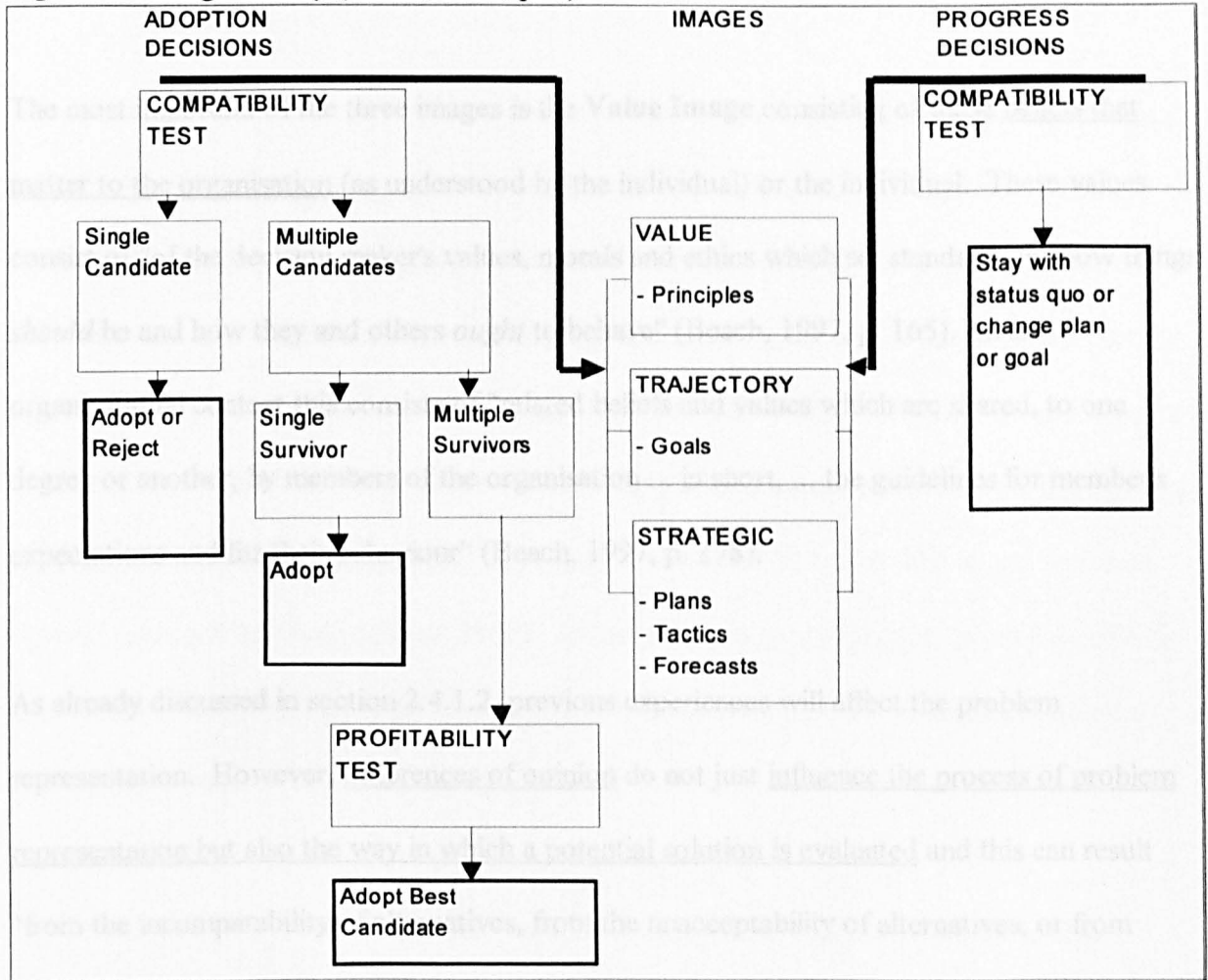
The literature on problem solving is useful for identifying reasons why different representations of the same problem may occur. **Beach's** (1990, 1997) *Image Theory* links decision making

with the process of option generation and evaluation, sharing with Huber (1985; 1989) the idea that it is the problem solving process, not choice, which is central to decision making (Klein, 1998). It is described here in some length because it draws together many of themes already identified and has a theoretical structure that helps in developing a model of decision aid acceptance. In particular, it offers a means to start to understand **how different problem representations can affect the acceptance of a potential solution**, and thus of the linked decision aid. However, it should be stressed that this thesis is not an empirical test of the validity of Image Theory.

Within Image Theory, the process of evaluation and problem representation is influenced by **three criteria described as images**. The alternative names are proposed as part of seeking to construct a version of Image Theory, more aligned with the literature on organisational culture, to reflect decision making behaviour in organisational rather than private contexts (Beach, 1997):

- The Value Image (also called Culture);
- The Trajectory Image (also called Vision);
- The Strategic Image (also called Strategy).

The full structure of Image Theory is set out in figure 2:1 (below), although not all the elements are discussed in this section.

Figure 2:1 Image Theory (Beach, 1990, p. 7)

Within the structure of Image Theory the choice criteria (Connolly, 1996; Beach et al, 1996b) is described as the **Compatibility Test**, where the decision maker checks whether a potential option fits their underlying principles, if it clashes with other goals being pursued and how it might be implemented. This can operate at a subconscious level (Walsh, 1996) with the decision rule being "what does a person such as I, or an organisation such as this, do in a situation such as this" (March, 1994, p. 58)? Essentially if an option passes these criteria it is adopted, further search for solutions is suspended and decision making often becomes a series

of adopt/do not adopt choices.

The most important of the three images is the **Value Image** consisting of those beliefs that matter to the organisation (as understood by the individual) or the individual. These values consist of "of the decision maker's values, morals and ethics which set standards for how things *should* be and how they and others *ought* to behave" (Beach, 1997, p. 165). In an organisational context this consists of "related beliefs and values which are shared, to one degree or another, by members of the organisation ... in short, ... the guidelines for member's expectations and for their behaviour" (Beach, 1997, p. 178).

As already discussed in section 2.4.1.2, previous experiences will affect the problem representation. However, differences of opinion do not just influence the process of problem representation but also the way in which a potential solution is evaluated and this can result "from the incomparability of alternatives, from the unacceptability of alternatives, or from uncertainty about the consequences of alternatives" (March and Simon, 1993, p. 155). March and Simon (1993) also suggest that the more a chosen option clashes with the previous choices and values of the organisation then the more likely it will cause debate, argument and possibly conflict.

Resolution of competing images can be through consensus, some form of voting or by the relative power of the participants (March, 1994). Sometimes a particular decision will be seen within the organisation as properly pertaining to an individual or section and there will only be

informal monitoring by other areas to ensure that "things work out well" (Beach, 1990, p. 13).

Other criteria, which will also influence the evaluation of a potential solution, include the goals and plans currently being pursued by the organisation or individual (the **Trajectory Image**) and the strategies and resources available to the decision maker to deal with a given issue (the **Strategic Image**). Current actions will already be consuming resources (such as time) so that a new option, compatible with the value image, may still clash with other goals that are important to the organisation. One consequence of this is to reinforce the argument that the protection of an already adopted goal may be more important to the decision maker than taking up a new option (Kerstholt and Raaijmakers, 1997). In turn this may lead to inertia, as once a decision solution has been adopted the decision maker may be reluctant to alter it despite conflicting information (Verplanken and Svenson, 1997).

This leads to an **important distinction** used by Beach (1990) to identify the **difference between adoption and progress decisions**. The former is the process by which new decision situations are dealt with, while the latter are the various implementation choices made while carrying out an already adopted solution. In decision theory both are evaluated in the same way with the validity of a given option being tested against the organisation's core values, whether it conflicts with other options and whether the necessary resources exist. However, a considerable volume of research (eg Janis, 1982; Bannister and Fransella, 1986; Silver and Mitchell, 1990; March, 1994; Hesketh, 1996; Kerstholt and Raaijmakers, 1997; Selart, 1997) stresses that there is a tendency to downplay the significance of negative information once a

particular decision solution has been adopted. In consequence, an option that fits with an ongoing progress decision will be subject to less intense scrutiny.

2.4.1.4 Summary of Key Findings

Returning to the questions posed in tables 1:1 and 1:2, it is now possible to develop some potential influences on acceptance. Table 2:3 gathers together the material from this section that is relevant to the questions as to *why different problem representations might occur* and *how these might influence acceptance*.

Table 2:3 Causes and Effects of different Problem Representations

Why might different problem representations occur?

Prior experience of actors (Wagner, 1991);
 How the problem is first recognised (Klein, 1998);
 Actors' differing perceptions of the nature of the problem (Payne et al, 1993a; Maule and Edland, 1997);
 Errors in initial problem representation (Funke, 1991);
 Flaws in how previous knowledge fits to the situation (Rosman et al, 1994).

How might these differences influence acceptance?

How acceptable is a potential solution to existing self-images (Beach, 1990);
 The size of such a gap could be important (March and Simon, 1993);
 The differences may be downplayed to protect an already adopted solution (Verplanken and Svenson, 1997; Kerstholt and Raaijmakers, 1997);
 How important is the decision? (Beach, 1990);
 An already adopted solution may be subject to less rigorous scrutiny (Richmond et al, 1998);
 There maybe more agreement with an already adopted solution as the original differences in problem representation have been resolved (Selart, 1997).

Reasons for the differences in problem representation can be gathered around the extent to which decision behaviour is adaptive to the nature, and understanding, of the task. In

particular, prior experience is an important influence on initial problem recognition and representation. Once a problem is initially structured, then there is an increasing degree of inertia in favour of retaining this description. From the research so far, it is less clear how these differences may then influence acceptance but the fundamental importance of the decision, the extent to which a potential solution clashes with existing beliefs and whether it is a new or ongoing problem are all relevant.

2.4.2 Issues from Social Cognition

Some of the social cognition literature is helpful in explaining reasons for different perceptions of a problem between individuals within an organisation. However, as with defining decision making, quite what constitutes social cognition is open to debate, especially in how it differs from social psychology (Brown, 1986) or theories of organisational culture (Smircich, 1983; Hatch, 1991; Furnham and Gunter, 1993).

Social cognition has been argued to be a reaction against what was seen to be the excessively experimental trend in social psychology and the resultant emphasis that group actions were nothing more than the “sum total of actions and attitudes of the individuals who comprise the collectivity” (Augoustinos and Walker, 1995, p. 2). In contrast, Boles (1999), argues that research from a social cognitive perspective provides a bridge between the personal and the social with a "focus on how individual's perceptions and beliefs about what knowledge is shared with group members in turn affects their own information processing and resultant beliefs" (p.

327).

Equally the difference between social cognition and theories of organisational culture is blurred. Smircich (1983) points to a continuum in organisational research that collectively “legitimizes attention to the subjective, interpretive aspects of organisational life” (Smircich, 1983, p. 355). These approaches can be conducted in different ways, with different tools and perspectives but it is possible collectively to distinguish them from “the idea that management is a process of planning, organisation, command, coordination and control” (Morgan, 1986, p. 25).

Smircich (1983) suggests that the focus of social cognition researchers is to “consider organisations as systems of thought. Their interest is in charting the understandings or rules” (p. 354). Overall, there are significant links between the concerns of theorists of organisational culture and those with a social cognition approach, particularly in the extent to which the individual is seen to construct and enact their world (Smircich and Stubbart, 1985). However, social cognition differs from approaches of organisational culture through a “**focus on the individual's interpretation of the social world**” (Harris, 1994, p. 285) reflecting the contention that “memory itself is a reconstructive process, there is always the potential for manipulation after the fact” (Lories et al, 1998, p. 9).

Social cognitive research in organisations is broadly similar to the wider field of social cognition (Harris, 1994; Augoustinos and Walker 1995). The differences tend to be methodological, and these are discussed in chapter four (Jenkins, 1998), but the core is a

shared emphasis on the use of frames (also called images, scripts, stories or schemas¹) in memory to organise knowledge and in the interpretation of external influences.

2.4.2.1 How Individuals Interpret External Events

This section is relevant as it supplements the research already discussed in section 2.4.1.2 on reasons for differences in problem recognition and offers more evidence for how such differences can emerge and then be sustained.

Weick (1995) describes the formation of frames of reference as the "placement of items into frameworks, comprehending, redressing surprise, constructing meaning, interacting in pursuit of mutual understanding, and patterning" (p. 6). He also argues that this sees an interaction between the individual's beliefs and the social norms. Yzerbyt et al (1998), for example, point to the way in which changing socially accepted rules can remove criteria such as gender, race or sexuality as valid sources of information for decision making.

The group of information in a frame can be as simple as knowing how to order a meal in a restaurant (Eysenck and Keane, 1990). It may also encompass complex tasks learnt as part of job-specific training, such as how to fly an aeroplane, or to be applied in conditions of stress such as firefighting (Klein, 1998). Basically once a routine is learnt, its subsequent application can often be little more than an unconscious act or, at least, be applied with such speed and

¹ For simplicity the word frames has been used throughout this discussion.

apparent lack of reflection as to appear to be so (Klein, 1998).

The process by which individuals understand and respond to new information is "based in large part on the outcomes of contrived mental dialogues between themselves and other contextually relevant .. individuals or groups" (Harris, 1994, p. 297). In turn, this links to theories of decision making where individuals create scenarios about the future (Beach et al, 1996a), to "provide templates for problem solution ... [and] facilitate anticipations of the future, goal setting, planning and goal execution" (Harris, 1994, p. 286).

As with any problem representation, once formed such scenarios "tend to shape both what people might think about and what they ignore in policy making" (Dutton and Kraemer, 1985, p. 189). Thus frames are then used to interpret further information in the light of previous experiences and current beliefs, as:

"individuals interpret relationships among variables according to their favourite theory .. Lower rates of heart attacks in Mediterranean countries are interpreted by the manufacturers of olive oil as a statement about the effectiveness of certain kinds of fats in the diet, by wine-makers as testimony to the therapeutic values of wine, and by hedonists as a statement about the effectiveness of ... a slower-paced lifestyle" (March, 1994, p. 84).

This assumption forms the basis of social constructionist theories in psychology (Willig, 1999), as once a given representation has been formed it becomes part of an individual's routine knowledge store. As "how people categorise experiences initially is how they will remember them later" (Schank, 1982, p. 233), Bannister and Fransella (1986) suggest a consequence is

the individual's unwillingness to alter central elements in their belief systems despite contradictory evidence. As a result, existing frames tend to be relatively inflexible when faced with new evidence from other people or situational changes (Reger and Palmer, 1996; Kerstholt and Raaijmakers, 1997), and the cognitive representation of a situation lags behind actual changes (Rosman et al, 1994).

2.4.2.2 Influences on Intra-Organisational Agreement

A particular value in social cognition research in organisations is its emphasis on the reasons for agreement and disagreement between members of an organisation (Jenkins, 1998).

Hodgkinson (1997) reviewed the literature that had taken a cognitive approach to the representation of the competitive structure of industries and came to the conclusion that "managers with common functional and/or role responsibilities are more similar in their views compared to their counterparts with differing functional and/or role responsibilities" (Hodgkinson, 1997, p. 644). The potential for differences in opinion does not preclude groups of individuals from sharing similar representations when, for example, "as people labour together on common tasks, they often develop similar understandings of the nature of their tasks" (Levine and Moreland, 1999, p. 268).

There is a growing body of research looking at the issue of differences between individuals in organisations from a social cognition viewpoint. Examples include studies of the **Chicago banking industry** (Reger, 1990a; Reger and Huff, 1993), **pump manufacturing companies**

for the North Sea Oil industry (Daniels et al, 1994) and amongst managers with 20 years experience in the **home electronics industry** in Finland (Laukkanen, 1994).

To explore if there were patterns to agreement and disagreement, Reger (1990a) used Personal Construct Theory to capture managers' understanding of the competitive structure of the **Chicago banking sector**. This is a highly specialised industry with managers who served for lengthy periods in the same firm, and when they moved, shifted to a similar company. Daniels et al (1994) used a variant of this methodology and concentrated on **pump manufacturing suppliers**, an industry with a similar employment pattern. Both studies found considerable variances of opinion about how the competitive environment was described, although this was more marked in Daniels' study (Hodgkinson, 1997). Both also found patterns of agreement within functional areas.

Laukkanen (1994) sought to uncover the cognitive representations, and the processes by which they interpret external events, of individual managers concerning the **home electronics industry** in Finland. An important finding was of simpler levels of understanding among those responsible for functional work (eg sales) than by senior managers.

Although these studies found that there are patterns to the differing representations within an organisation one recent study, concentrating on managers in the UK automotive industry, found "little evidence of industry, organisation or even group level homogeneity in the knowledge structures that managers hold of their competitive environment" (Johnson et al,

1998, p. 140). Despite this particular study, overall, this area of research suggests that **there are patterns of agreement** between those who share a functional role rather than those from different companies or specialisms.

2.4.2.3 Summary of Key Findings

In summary, social cognition research reinforces three important themes already identified in section 2.4.1:

- *how the expertise and past experiences of the individual will influence current understanding of a situation and perceptions of the consequences of choices;*
- *that, as a result, there will be differences in these representations between individuals;*
- *once formed these representations are relatively inflexible to changes in the external environment.*

Central to the argument already developed in section 2.4.1 is how "the activation and use of existing knowledge and preconditions can bias social judgements" (Augoustinos and Walker, 1995, p. 109). This perspective allows an elaboration of table 2:3 to address the effect of different problem representations on acceptance, and also to improve the understanding of how such differences can occur. Table 2:4 brings the key arguments together:

Table 2:4: Using Social Cognition to understand Individual Differences

Reasons for different representations:

Extent to which frames are a mixture of individual and social beliefs (Weick, 1995);
Way in which once formed frames are unresponsive (Bannister and Fransella, 1986);
Way in which once learnt the application of frames is unreflective (Klein, 1998);
Way in which once learnt they are in turn used to interpret future events (March, 1994);
Extent to which those who share functional responsibilities tend to agree (Hodgkinson, 1997).

Implications of such differences:

Those who do not share the same set of experiences or understanding of organisational role may then tend to disagree (Daniels et al, 1994).

At this stage, starting to develop a fairly full list of the factors which might influence the acceptance of decision aids is possible. This would encompass issues relevant to the type of aid and problem in section 2.3, material drawn from the literature on decision making and problem solving (table 2:3, p. 43) and elaborated from a social cognition perspective (table 2:4). It is also now possible to explain (in terms of table 1:2) how different problem representations may occur and that some groups/individuals are more likely to agree with each other than with different members of the same organisation. How these differences could affect acceptance has been identified although this needs more elaboration.

One implication of the effect of groups who share a role tending to agree is that (Simon, 1981) the decision aiding process is more likely to embed the assumptions and beliefs of those who proffer the technical advice (finance, marketing, planning), and also of the senior managers who possess the power of veto over the process. Those **excluded from direct influence** may still have significant involvement with the decision aid or instead merely be affected by its outcomes

without any direct control over their destiny. In effect, those excluded will be less likely to agree with the problem representation in the aid if it has not been designed to reflect their views.

2.5 Definitions of Decision Aiding and of Acceptance

This section takes a step back from identifying potential influences on decision aid acceptance and instead defines just what is meant by decision aiding in organisations (section 2.5.1), whether the correlation between these and any form of problem representation can be sustained (section 2.5.2) and just what is meant by acceptance (section 2.5.3).

2.5.1 Decision Aiding in Organisations

The description of decision making advanced so far places stress on how individuals adapt their behaviour concerning their perception of the problem, the available solution routines, and organisational constraints on what options are acceptable. This approach describes decision making not as a process of multiple choice between known options and instead more as problem representation and the sequential acceptance or rejection of potential solutions. The model of decision making developed so far has implications for what can then form a decision aid. In particular, this can be concerned with problem structuring and how to make choices between various options.

A common feature of decision aids for personal choices (from Humphreys and McFadden, 1980, to Timmermans and Vlek, 1994) is that the aid is a discrete IT-based system with which the decision maker interacts to structure the problem and which will generate directive advice as to the most appropriate solution. In this literature (section 2.3.1) it is clear just what is the aid and what is its potential value. The extent to which such aids have been successful has been subject to a few enquiries including Bronner and de Hoog (1983) and Timmermans and Vlek (1992). In the main they have stressed the effect that the nature of the problem will have on the perceived validity of a formal approach to decision aiding.

However, when the focus becomes one of help for decisions in organisations there is less clarity in how the support is to be offered and as to whether pointing to the decision aid as a discrete system is still feasible. For example, Payne et al (1993a), suggest quite a broad definition of decision aiding encompassing improving the layout of information, training courses, operational procedures, as well IT-based systems. In a similar vein, Rohrman (1986) suggests a definition for decision aiding as "any explicit procedure for the generation, evaluation and selection of alternatives" (p. 365).

Broadly it is possible to discern **two branches** in the literature on how to support organisational decision making. **One** is that this should be technological and this leads into consideration of what are variously described as Decision Support Systems (DSS), Expert Systems (ES) and Knowledge Based Information Systems (KBIS). The **alternative** is to put the stress on the type of discussions and information needed to support organisational planning

systems.

Broadly the **first** view about what forms decision support in organisations can be characterised as being essentially technologically driven (Boland et al, 1995). This sees the nature of decision aids in organisations as IT-based Decision Support Systems. These may vary from seeking to produce analyses of potential solutions, to actually making the decision (commonly in areas such as scheduling problems or approving loan requests). This approach shares with Von Winterfeldt and Edwards (1986) an expectation that the aid is easily recognised as a discrete part of the process but diverges in moving the focus to problem representation as much as choice (Partridge and Hussain, 1995).

On the other hand several approaches to understanding how to design support for organisational decision making lay stress on the importance of the planning process. In this, it links closely with mainstream decision making concerns such as how problems are understood, how solutions are generated and how agreement is reached as to how appropriate potential solutions are. This is a theme for both Beach et al (1996a) and van der Heijden (1996) with an emphasis on a planning process designed to create scenarios to test the validity of different problem representations and solutions.

In itself there is nothing in van der Heijden's approach to organisational planning which implies that a formal DSS tool is inappropriate. However, he stresses instead that the support environment consists of a series of structured conversations that describe "current and future

states of the business environment” (van der Heijden, 1996, p.7). Following Jungermann (1985), Beach et al (1996) describe how what they call “deliberative decision making” (p. 145) can be seen as a process of scenario construction, testing and then adoption of a potential plan. This could be individual or as part of a group process. Again it does not mitigate against the use of DSS but the description is entirely of cognitive and social processes.

The technological approach to organisational decision support can be characterised as arguing that decision aids in organisations are as readily recognisable as those approaches used to guide personal choice. Admittedly the DSS literature also stresses problem representation and often (Boland et al, 1995) accepts that technological limitations mean that the final choice process, for all but well defined problems, must be left to the decision makers. Approaches to decision aiding in organisations drawn from non-IT perspectives stress how to assist the thinking about options and consequences that needs to take place. This thinking can be in identified forums and routines (van der Heijden, 1996) or be distributed amongst other actions (March, 1994; Klein, 1998). Despite the apparent difference between the two perspectives they are not as mutually exclusive as they may appear at first sight. The difference seems to lie in how the initial thinking about the problem takes place - is it in a technological or interpersonal forum. With some exceptions (eg Partridge and Hussain, 1995), there is an expectation that decision support for unstructured decisions will leave the need for discretion as to the actual choice among the actors (Alter, 1992).

From this, arguing that there are two extreme positions in organisational decision aiding is

possible. One stresses IT, and, in its purest forms, removes the need for human decision making. The other can be characterised as stressing the planning process, and, if not directly rejecting IT, argues that the necessary information gathering and structuring can be handled in various ways. Some of these methods for generating data can be IT-based and form a computer-assisted variant to the planning process (Dutton and Kraemer, 1985). If the level of technology, and direct influence on the decision making process, is used as the basis to distinguish between such approaches, it is possible to produce a taxonomy of:

- an **IT-based Decision Support System**, with a formal system to regularise choice and to represent the problem structure;
- a planning approach which makes use of **IT-based models**. These may draw material from other datasets in the organisation to allow what-if analyses to be performed. Although the system will use IT, it is subsidiary to the subsequent interpersonal decision process;
- a planning approach that is based on a basically interpersonal **decision aiding process** which sees little use of IT, and mainly consists of an organisational planning routine designed to explore the nature of a problem and identify potential solutions.

The difficulty in two of these definitions is that the nature of the actual aid is blurred. In the IT-based model description is the aid the IT-element alone or does it include the subsequent interpersonal process? The definition which stresses that the whole process is essentially cognitive or interpersonal has the complication that it could be used to describe almost all decision making - in effect is **there such a thing then as an unaided decision?**

To resolve this, it was expected that an aided decision (however this happens) must display at least the following attributes:

Table 2:5 Essential Characteristics of Decision Aids in Organisations

- | |
|---|
| <ol style="list-style-type: none">1. A definable organisation planning process;2. A recognisable problem and desired outcome;3. Systems for gathering information;4. Systems for analysing information;5. Maybe some use of IT, whether as a simple model, a datastore or more directly linked to the decision process. |
|---|

It should then be broadly possible for members of the organisation to describe these as a package. For example, as the way in which resource allocation decisions are made.

2.5.2 Decision Aids as Problem Representations

Section 2.5.1 has defined decision aiding in organisations in a loose manner. In particular, such a definition supports the use of the literature in section 2.3.2 to explore potential reasons for accepting or rejecting specific approaches. However, to underline the value of the material developed in section 2.4, it is also necessary to support the assertion in table 1:2 that decision aids can be seen as a form of problem representation. Table 1:2 placed the argument that decision aids are a form of problem representation as **central to this thesis**. From this comes the argument that reasons for decision aid acceptance will be much the same as those which influence the perceived validity of any proposed solution in an organisational setting.

If the definition of decision aiding only encompasses IT-based Decision Support Systems or, at

a lower level of technology, a model based within a database or spreadsheet structure, seeing this as a form of problem representation is relatively easy. The literature advocating both approaches pays considerable attention to how to elicit the information needed to structure such a model (Hart, 1989) and representing it in computer code (Partridge and Hussain, 1995).

Whether this is done in a way that seeks to encompass the views of most staff, or to promote a particular section's approach (Dutton and Kraemer, 1985), it will still be a process of simplifying the situation to produce a malleable model (Asch and Kaye, 1989), which can be used to run what-if analyses of a given situation (Sprague, 1987). **It is the process of simplification that is critical to this argument.** Decisions need to be taken about what is included and excluded and what are the key interactions between variables. Equally choices will have been made in terms of what future variables are important. What is produced becomes **one way** of representing the situation and this representation will then be subject to scrutiny within the organisation as any other would be (Cook, 1992).

It is, however, more difficult to equate the style of decision support advocated by van der Heijden (1996), for example, as a form of problem representation. The key here is to argue that decision aiding is a process conducted at various levels and ways within the organisation. For his approach to strategic planning to work, van der Heijden argues that one need is for "a suitable structure in which all this seemingly unrelated data can be expressed, contextualised and thereby made operationally useful to the user, for the purpose of idea generation and testing of policy ideas and strategy" (van der Heijden, 1996, p. 186). It is in the creation of the

suitable structure that the link to the basic process of problem formulation can be made.

A consequence is that not all parts of an organisation may agree with the assumptions within the planning process. Mintzberg (1994) suggests that the process of strategic planning is often not acceptable because it is controlled by the organisation's planners rather than its managers. Mintzberg also argues that too many assumptions as to the nature of the problem are embedded at the start of the process and thus not exposed to scrutiny or even made explicit to other users.

2.5.3 The Meaning of Acceptance and Usage

Some of the formal difficulties in defining these terms have already been considered in section 1.2.4. It has already been noted that the use of acceptance in the thesis title is devoid of part of its traditional implication of a favourable reception and instead the meaning is closer to that for usage. The implication of this for the thesis is that it is not enough just to consider whether there is agreement or not with the aid (ie acceptance in its full sense) but also whether or not the particular level of agreement influences usage. In effect is it possible to have a situation where there is limited (or no?) agreement with the aid but it is still in use.

This distinction lies at the heart of the two models developed in chapter three. The effect of the cognitive and social factors, as explored in this chapter, should mean the intra-organisational agreement or disagreement is linked to acceptance or rejection of the decision aid respectively. The other unresolved issue is how to measure agreement and, indeed, acceptance. Techniques

for this are discussed as part of the research methods (chapter four) and were refined during the early theory-building case-studies (chapter five). The extent to which these concerns were resolved forms a major area of discussion in the summary chapters.

2.6 Summary

This chapter started by repeating three of four themes which needed to be resolved before any effective empirical testing could take place. These were:

- what factors influence acceptance?
- how is decision aiding in organisations to be defined?
- what is meant by acceptance?

This chapter has sought to resolve these questions by drawing information from the material in the decision making literature on the acceptance of decision aids and from the wider body of literature, from any perspective, on the acceptance of decision aids. It then sought to explain these initial findings using the literature on unaided decision making and this was reinforced by some material from social cognition. Additionally, this literature identified further influences on acceptance if the basic argument of some equivalence between aided and unaided decision making could be sustained. The fourth issue from table 1:1, “what constitutes the cognitive and social factors” is the focus of chapter three.

The material on decision aid acceptance yielded the following potential factors:

- that the acceptance of an aid may be influenced by situational factors (Rohrmann, 1986);
- that the nature of the aid can be a limitation, especially if it is based on decision theory (Brown and Vari, 1992; Watson, 1992);
- that the aid may be rejected if it is a poor fit to the problem (Brown and Vari, 1992; Cook, 1992);
- that the aid maybe rejected if the decision maker feels it is inappropriate to the type of problem or that the problem is too trivial to invest much effort in (Timmermans and Vlek, 1992).

From this, and other related literature, two core themes can be discerned. One is that the nature of the problem is an influence on the perceived validity of a formal decision aid. The other is that the aid will be rejected if there is a mismatch between the representation of the problem in the aid and the perception of the actors. The latter is a common finding and it was possible to use the literature on problem solving and decision making to explore why:

- decision making and problem solving behaviour is adaptive to the challenges of the task;
- how a problem is initially represented is partly a product of the previous experience and expertise of the individual(s);
- once formed a problem representation is then unresponsive to changes in the external environment;
- one manifestation of this can be that a lower degree of scrutiny is applied to the consequences of continuing with an already adopted goal as opposed to having to make a new choice;
- what is less clear is what the effect of disagreements might be, in some instances they could be latent in others cause significant dissent;
- agreement between members of an organisation is linked to their respective roles (whether grade or functional);
- from this, the style of their interaction with the decision aid maybe one determinant of their willingness to accept it.

In terms of defining a decision aid in an organisational context, it was acknowledged that this was less clear-cut than for individual decisions. Some alternative definitions were explored and

these were often as vague as arguing that an aid is anything that helps decision making (Rohrmann, 1986; Payne et al, 1993a). However, on reviewing both the literature on IT-based support for decision making and also on inter-personal support it became clear that both were, in effect, talking about a **planning process**. This process could include a significant element of IT (in effect a DSS), some IT (a model or datastore) or be essentially interpersonal. What it has, though, is a means to think about and structure the problem and to evaluate the validity of potential solutions.

This blurs the nature of the aid, but table 2:5 (p. 56) sets out what is seen to be the minimum defining characteristics. One particular consequence of this formulation is that the reasons for the perceived validity of the aid can rest with either how the problem is structured or how this basic information is used to generate, evaluate and implement options. In effect, the influences on the acceptance of the aid can include both the accuracy of its basic problem representation and the support it offers to particular problem solutions. A strength of this formulation is that it supports the proposed link between aided and unaided decision making.

Overall this chapter has generated an operational description of decision aiding in organisations and explored what is meant by acceptance and agreement in this context. What it has not done is to separate the potential influences into the cognitive and social factors or to set up a formal model that can be tested. This gap is filled in the next chapter.

CHAPTER THREE: MODELS OF DECISION AID ACCEPTANCE

“Decision aids should be evaluated by the same criteria that are employed to evaluate unaided human judgement” (Ashton and Ashton, 1995, p. 24).

3.1 Introduction

Chapter Two started to deal with answering the various questions posed in table 1:1 (p. 4). It has identified various reasons why a decision aid maybe rejected including its failure to represent the underlying problem in a manner acceptable to all members of the organisation, issues connected with the type of problem and the style of decision aid being considered. What chapter two has not done is to consider which of these factors are **generic** (in that they apply to any decision situation) and which are **specific** (in that they apply to the aided decision under scrutiny). Developing such a distinction is essential in identifying what are the cognitive and social factors that affect acceptance (ie the generic factors) and **form the basic model** to be tested (section 1.2.2, p. 8).

Tables 2:3 (p. 42) and 2:4 (p. 50) have argued that a major reason why a given problem representation maybe rejected is that it is not shared by all members of the organisation. The research findings of both decision making in organisations and of social cognition studies tends to stress the importance of current role and past expertise in informing these representations. This is important in developing the basic model (the generic or cognitive and social factors), as such influences on decision aid acceptance are the different ways in which problem

representations can be formed and how or why these may not then be shared within the organisation.

Overall, chapter two identified various influences including:

Table 3:1 Summary of Influences on Acceptance of Decision Aids

that there are limitations in the type of problem for which formal decision aids can be used, because of difficulties in creating decision aids that can help with ill-structured problems. Also technical and cost constraints may make adopting a new work approach unacceptable;

that the theory used to underpin the decision aid is inappropriate, in particular there is no reason that decision aids should be based on decision theory, instead it might be preferable for them to aim to be valid representations of the particular problem without relying on any particular decision making approach;

an already adopted decision is subject to a lower level of scrutiny than that applied to a new option. This can lead to the decision maker ignoring adverse evidence or restructuring their understanding of the decision so as to make this particular choice more acceptable, and how the expertise and past experiences of the individual will influence current understanding of a situation and perceptions of the consequences of choices;

the varying degree of influence an individual has over the structure of the aid. Those who control the aid in either technical or managerial terms will be more likely to ensure that it embeds their representation of the nature of the problem. Equally perceptions as to the nature of the aid may vary between those who have close involvement with it and others in the organisation who for reasons of grade, or job function, are less involved in a particular decision.

This material forms the core of this chapter which organises it to develop two separate models to allow a separation of the cognitive and social factors from other potential influences. This forms the bridge to the subsequent empirical work as it was then possible to test the thesis question (*“are cognitive and social factors sufficient to explain the acceptance of decision*

aiding processes in organisations”) using pattern matching (Yin, 1994) to interpret the empirical data (discussed in more detail in chapter four). This chapter performs the essential precondition of developing “rival theoretical propositions, articulated in operational terms” (Yin, 1994, p. 108).

The **basic model** that the reason for the acceptance or rejection of a decision aid is linked to the degree of intra-organisational agreement with it (ie the generic factors) is developed in section 3.2. The next step is then to predict what combinations of empirical findings are to be expected if the generic factors are the sole cause. Reasons why this relationship may not hold forms the **alternative model** that assumes that factors specific to the particular decision also have an influence on acceptance (section 3.3).

3.2 Basic Model: Generic Factors

Sections 2.4.1 and 2.4.2 have identified several reasons why the **perception of a problem may vary between individuals in an organisation** and how these could lead to intra-organisational disagreements as to the validity of the aid. This forms the basis of the argument as to what the generic factors are and how they influence the acceptance of any decision solution whether the process is aided or not. The **generic factors can be summarised as** the influences on acceptance of a decision aid from the level of intra-organisational agreement with a given problem representation and a particular solution. An important step in this structure is the argument developed in section 2.5.2 that essentially decision aids are a form of problem

representation and, from this perspective, are subject to the same type of evaluation as any other (aided or not).

If the generic factors are the sole cause, then it is the extent to which there is agreement with the problem structure (including the solutions it supports) embedded in the decision aid that will determine its acceptance or rejection. In effect, using section 2.5.3, this is equivalent to saying that if the aid is in use then there should be agreement with it within the organisation.

3.2.1 Defining the Generic Factors

In Table 1:1 an initial step was identified as the need to define what are the cognitive and social factors that influence the acceptance of decision aids. In this thesis the **cognitive factors** are equated with the process of individual problem representation and solution evaluation using the material covered in section 2.4.1. In turn the **social factors** are held to be the pattern of agreement with a given representation in the organisation (section 2.4.2).

Both decision making and social cognition research implies that problem representation is linked to past experiences (Beach, 1990), with an initial tendency to frame a problem in a manner relevant to the individual's expertise (Allison, 1971), and perception of the solutions available (Payne et al, 1993a). Such representations are not uniform across the organisation (Harris, 1994), and both Daniels et al (1994) and Laukkanen (1994) argue that these representations do follow role patterns within an organisation, with those whose work is

functionally similar more likely to agree.

This section draws from the material presented in sections 2.4.1 and 2.4.2 to explore reasons for this. It develops the **basic model** mentioned in chapter one especially the reasons for different problem representations between individuals (section 3.2.1.1). This is linked to how an issue is initially **recognised** and the subsequent process of formulating a solution (section 3.2.1.2). The consequences of such differences for acceptance form section 3.2.2.

3.2.1.1 Basic Pattern of Potential Differences

Section 1.2.2 (p. 10) briefly sketched out how such different representations may occur as to the value or structure of a decision aid. This section now takes that initial suggestion and develops it in much greater detail. The central element of the original formulation was that different representations of the value of a decision aiding process may follow the different levels of involvement with, and degree of control over, the decision aid in the organisation. This led to a fourfold division between:

- those with the *technical knowledge* which forms the basic information set within the process (such as staff in finance, marketing, planning);
- those able to *set the overall conditions* within which the subsequent decision making will take place (for example senior managers);
- those who are *involved in the process but lack* some of the technical knowledge and influence. They may, however, have an appreciation of the implications of a given decision for their own particular area (these may typically be section heads and other middle managers);
- those who are *affected by the subsequent decision but are not really involved* in its making (other staff and managers whose functional interests are divorced from

the particular decision being made).

This structure will hold if the problem representation embedded in the aid is more likely to reflect the views of those with technical or managerial control (Dutton and Kraemer, 1985) can be supported. If this is the case, then the differences within the organisation as to the validity of the decision aid will mirror the different relationships between the individuals and the decision aid. **Note this is not necessarily the same as differences about the basic structure of the aid.** One cause of differences might be that the different groups perceive the nature of the aid in very different ways. However, it is also possible that they agree as to the structure and nature of the aid but place different value judgements on its validity.

3.2.1.2 Reasons for Different Opinions about the Decision Aid

The argument so far has placed emphasis on the potential for differences of opinion to arise either about the structure of the aid or its validity. This section sets out reasons for such differences, again using the findings already laid out in chapter two (especially sections 2.3 and 2.4, summarised in table 3:1).

Perhaps the **simplest potential division** could be between the designer(s) of the aid and the user(s). At one level is an expert with a detailed knowledge of the operating system as opposed to other staff with their own knowledge of the problem and the organisational environment. This might be especially marked if the decision aid is based on decision theory, or

a high level of technology, which will need to be controlled by an expert (Partridge and Hussain, 1995) who must translate the information provided by staff in the organisation into the necessary format. Even if the approach is less technological, someone must devise the aid and will have a close understanding of its assumptions, linkages and simplifications that may not be obvious to others (Asch and Kaye, 1989).

However, **this relationship could be more complex** as there are various reasons for different problem representations between individuals. Potential divisions of opinion could be between:

- those in a position actually to make the decision as opposed to those who are involved but lack such overall influence;
- those for whom the decision is central to their role and those to whom it is important but who have other concerns;
- those able to determine what is discussed, considered and how, and those who must broadly operate within this environment.

These possibilities all imply the existence of another group within the organisation - those who are peripheral to the process either because of job role, grade or personal interest. In summary, it is now possible to return to the initial suggestion that there could be four groups who may have different understandings of a particular problem, and therefore derive different representations of the value of the decision aid, as:

- One group will possess a high degree of technical knowledge about the process and the simplifications needed before this can be put into operation. In effect these people will provide technical **advice**;
- Another group will possess a high degree of strategic control over the resultant decision but will rely on the former for technical advice. In effect those staff with overall **ownership** of the decision process;

- A further group will both lack the full technical knowledge and have a reduced degree of strategic control either because of their position in the hierarchy or because it is an issue peripheral to their primary role. In effect staff who **use** the decision aid but lack either or both of control and in-depth knowledge;
- Finally **other** staff may be very interested in the outcomes but due to role or grade be little more than onlookers.

Each of these subgroups may form different perspective on the aid as:

Table 3:2 Different Problem Representations within an Organisation

Group	Key features of problem representation:
Advisors	Influenced by technical nature of the issues, able to control the modelling process as such, some awareness of the institutional and strategic environment;
Owners	Aware of the technical nature of the issue, able to direct the modelling process, emphasis on a view of the institutional and strategic environment;
Users	awareness of technical and organisational issues tempered with other influences such as own budget or own area of technical responsibility;
Others	lack of awareness of the technical issues, some awareness of organisational environment (which may not be shared with the above), strong awareness of the implication of any decision for their own specific areas.

The four groups identified in table 3:2 will have different degrees of involvement with the decision aid. This can be summarised as:

- **Advisers** will have a significant level of interaction with the system (may be the designers), and will have a high level of technical control over the content but possibly less over the strategic usage of the results;
- **Owners** will be similar in level of interaction, may have more strategic control but could be slightly removed from technical control, this group may also be characterised as the senior managers;
- **Users** may have a high level of interaction but less control over both technical content and strategic use of the results;
- **Others** may find their daily lives influenced by the results of a system with which they have only limited interaction and no control.

3.2.2 Relationship between Generic Factors and Acceptance

Consideration must now be given to what are the potential consequences of these disagreements concerning decision aid acceptance. Table 3:3 below expands table 3:2 to consider various ways in which the knowledge and responses of the four groups may vary and can be mapped onto their **degree of technical knowledge, degree of strategic control and awareness of local issues and constraints.**

Table 3:3 A Possible Taxonomy of the Users of a Decision Aid

	Level of Interaction with the aid	Level of Technical Control	Level of Strategic Control	Awareness of Local issues
ADVISERS	High	High	Medium	Low
OWNERS	High	Medium	High	Medium
USERS	Medium	Low	Low	High
OTHERS	Low	Low	Low	High

Table 3:3 starts to give clues about how different organisational roles may affect acceptance of a decision aid by suggesting that the problem representation used to derive the aid is more likely to be that of the advisers or owners. Outside this group, other members of the organisation will bring their particular concerns to consider the validity of a given representation. As a result, the value of a given decision aid may be questioned as to its impact on a particular section within the organisation by those with perhaps only limited understanding of its workings.

The generic factors argument becomes that the extent to which agreement between these subgroups will directly influence the acceptance or rejection of the decision aid. In effect three outcomes are possible:

- that there is general agreement with both the structure and validity of the aid and it is in use;
- that there is general agreement with the structure but not the validity of the aid, if the generic factors hold this should then lead to rejection;
- that there is no agreement either over structure or validity, again if the generic factors hold this should lead to rejection.

From the material in chapter two it is possible to construct several working assumptions to how differences between these groups could manifest themselves in their perception of the validity of the aid:

- First, following Laukkanen (1994), that the *cognitive representation of the decision aid and the surrounding issues will be more detailed amongst the first two groups*;
- Second, following Daniels et al (1994), that those *within a subgroup are more likely to agree with each other than with those in other categories*;
- Third is that those in the *first two categories (ie advisers and owners) are more likely to agree with the decision aid as it is more likely to embed their representation of the problem*.

This suggests that those with the greater degree of influence may have set up the aid so that it reflects their perception of the problem. From this, one piece of evidence is whether they can more effectively describe the structure and operation of the aid than other staff. Finally, this model also expects to see some structural order to any differences that do exist. So, for example, those described as users (table 3:3) will tend to agree among themselves more than

they agree with other staff in the organisation.

3.2.3 Key evidence for the Generic Factors

In terms of research design, Yin (1994) argues that a precondition for using pattern matching is to specify in advance what is the expected relationship between the hypothesised model and empirical data. If the generic factors are the main cause of acceptance, this must be reflected in the relationship between reported agreement and usage (acceptance) of the decision aid.

To answer whether "*cognitive and social factors are sufficient to explain the acceptance of decision aiding processes in organisations*" means considering the relationship between agreement and acceptance. At its simplest this would imply that if there is overall agreement with the structure and outcome of the decision aiding process then it will be accepted. The reverse argument (which would also support the positive hypothesis) is that intra-organisational disagreement should see its rejection, as found by Cook (1992). In turn, the null hypothesis will be shown in any breakdown in this association between agreement and acceptance.

In effect, the critical evidence for the validity of the **basic model**, which is that the generic factors are the cause of acceptance, is whether a situation is uncovered where there is general disagreement with the decision aid but it is actually in use. Here the generic factors are not the sole cause of acceptance since they, on their own, should lead to rejection. Subsidiary evidence for the basic model will also be found in terms of the reasons for, and pattern of, any

differences (section 3.2.2 above).

3.3 Alternative Model: Specific Factors

This section starts by developing three reasons, from the material in chapter two, which might also influence the acceptance of a decision aid that are specific to the particular aided instance being observed. Each of these will affect the relationship between agreement and acceptance hypothesised in section 3.2.3 in different ways:

- that the decision rules may vary between types of **problem situation**. Beach (1997), Kerstholt and Raaijmakers (1997) and Dunegan (1996) all identify the tendency of decision makers to persist with a chosen option despite contrary evidence. So the argument becomes that in these cases the evaluation rules are less stringent and levels of disagreement less important due to a desire to maintain the current situation;
- there are issues about how **decision aids** are designed (Dutton and Kraemer, 1985), what types of problems they are suitable for (Bronner and de Hoog, 1983; Timmermans and Vlek, 1992) and the theory behind the aid (Brown and Vari, 1992; Watson, 1992) which imply that the decision aid could become an issue in its own right within the decision process;
- that there will be issues **specific to the particular instance**. Examples may include the external pressures on, or power relations within, an organisation.

3.3.1 Defining the Specific Factors

The specific factors may modify the basic process of linking acceptance to intra-organisational agreement because of issues specific to the aided-instance under investigation. This could have various effects, from reducing the importance of any disagreements to making it more likely that a particular decision aid will be rejected precisely because of how it has been designed and

implemented.

A further issue is whether or not it is who agrees with the decision aid, rather than how much agreement, which determines acceptance in the sense of actual usage. Collectively these issues form the **alternative model** described in chapter one and this section develops the potential significance of three specific factors:

- effect of the problem situation (section 3.3.1.1);
- nature of the decision aid (section 3.3.1.2);
- issues specific to the particular instance (section 3.3.1.3).

3.3.1.1 Effect of the Problem Situation

Rohrmann (1986) suggests the **nature of the problem** as one influence on the effectiveness of a given decision aid. This could be important in that certain problem types are perceived to be unsuitable for certain approaches to decision aiding. For example, there are technical difficulties in developing effective IT-based decision support for ill-structured strategic decisions (Kersten and Mallory, 1990; Boland et al, 1995).

Problem type may also be an influence on decision aid acceptance due to the perception of the users about the appropriate way to solve their particular decision. Bronner and de Hoog (1983) found an attribution of the value of formal decision aids to particular types of problems, described by their respondents as "not too trivial ... or too emotionally important ... but for problems like choosing a job, an education, consumer durables or holiday destinations"

(Bronner and de Hoog, 1983, p. 290). The argument being that in the first instance there was no need to accept the costs of using a decision aid, and, in the latter, it would be of limited relevance as this was not a situation where individuals would decide using formal statistical reasoning (Mitchell and Beach, 1990). This attribution of computerised decision aids to certain types of problem situations is echoed by Timmermans and Vlek (1992).

However, while these concerns may limit the use of IT-based decision aids to certain situations, they are not the only way in which aspects of the specific problem will affect decision behaviour. One reason that decision behaviour may vary between problem situations is whether or not the current **status-quo is a sustainable option** (Silver and Mitchell, 1990; Rosman et al, 1994; Kerstholt and Raaijmakers, 1997; Richmond et al, 1998). The consequence maybe that a decision aid for an ongoing decision, with a valid status-quo option, could be accepted on these grounds alone whatever the degree of disagreement in the organisation. The research in section 2.4.1.3 (eg Kerstholt and Raaijmakers, 1997) is clear that once a potential solution has been formulated there is considerable inertia in continuing with this course of action. In effect it has a lower rejection threshold than a new decision (Richmond et al, 1998). The differences of opinion as to its validity may still exist but become latent if no significant new factors are introduced.

3.3.1.2 Nature of the Decision Aid

Not only might the **approach to decision aiding** limit its perceived value to certain types of

problem situation, but the decision aid itself may be a focus of debate. As already identified in section 2.3, rejection becomes more likely if the problem representation in the aid is different to that held by others in the organisation. However, this could be more marked if the aid is being used to promote a partisan interpretation of the problem (Dutton and Kraemer, 1985; Mintzberg, 1994), or the technology results in a decision environment unfamiliar to the users (Hinton and Kaye, 1996; Agarwal and Prasad, 1998).

Overall three main issues will influence the acceptance of a problem representation embedded in a decision aid, rather than the problem representation as such:

- does the decision aid seek to impose a **particular approach to decision making**?
- does the decision aid seek to impose a **particular working environment**, in particular does the level of technology make it seem abstract and remote to most users?
- is the **problem representation** embedded in the aid a partisan reflection of the variables and available data?

Whether the aid seeks to impose a **particular approach to decision making** (Watson, 1992) or a **particular work environment** (Agarwal and Prasad, 1998), the consequence, for acceptance, is similar. In both respects the result can be that it is disagreement with the nature of the aid, rather than its representation of the problem, that leads to rejection of the decision aid.

For example, limitations in using decision theory as a base for decision aids has already been discussed in section 2.3.1. Equally problems can result if the IT system fails to recognise that "work practices encompass not only procedures prescribed by operations manuals, but also the

general ways people co-ordinate, communicate, make decisions and perform other tasks in a business" (Alter, 1992, p. 3). The difficulty, in particular for a DSS approach, is that often "just planning techniques get incorporated rather than knowledge on strategic actions ... [and that verbal information while being] ... important in strategic planning ... is not incorporated in DSS generators" (Moormann and Lochte-Holtgreven, 1993, p. 409).

Finally all decision aids are vulnerable to the question as to the validity of the **basic problem representation** embedded in the system (section 2.5.2) and there is a danger of unacknowledged decision making being conducted when determining what the model should and should not represent. Dutton and Kraemer (1985) argue that to generate a useful decision aid, the quality of the modelling process may be more important than the actual model and "when the modelling process is carried on as an isolated technical exercise or as an obvious partisan manoeuvre, the models tend to lack relevance or credibility" (p. 211). A model may be just another view of the problem with its own set of assumptions and become another disputed element, especially if "the promotion of a specific world view and set of policy recommendations were the primary objective" (Granger-Morgan and Henrion, 1990, p. 298).

Overall various features of the decision aiding approach may increase the likelihood that the aid may be rejected. These include:

- *reliance on decision theory* to produce its decision making rules (Watson, 1992);
- the way in which it *represents the problem* may not be universally acceptable or, given technological issues, understood (Alter; 1992);
- the *focus on IT* blurs consideration of how the decision makers operate (Boland et

- al, 1995);
- the *danger of over simplification* with important factors omitted because of difficulties in identifying or codifying them (Hart, 1989);
- forgetting that *a model is a model* and thus a means to generate predictions. This inability to foretell the future may lead to the model being labelled as inherently inaccurate (Asch and Kaye, 1989).

Three different approaches to decision aiding were defined in section 2.5.1 (p. 56) as decision aid as **Decision Support System, IT-based model or planning system**. The issues identified in this section may result in a DSS, or model, approach being more likely to be rejected than a decision aiding process. A consequence is that while all are equally open to challenge concerning the assumptions of their problem representation, the more technological approaches have the additional difficulty that the **user must first come to terms with a potentially unfamiliar way of representing the problem**.

3.3.1.3 Issues Specific to the Particular Instance

Other specific factors which influence acceptance are related to the **unique set of circumstances** applying to the particular decision being studied in the particular organisation. Some of these concerns have already been discussed in section 2.3.2 and can be subdivided between **internal and external factors**.

Internal factors include power relationships within the organisation influencing decision making (March and Simon, 1993; March, 1994). This raises the possible outcome that what matters for decision aid acceptance is **who** agrees with the aid rather than **overall** intra-

organisational agreement. It has already been suggested, in section 3.2.2, that those with technical knowledge and organisational influence are more likely to find their representation of the problem embedded in the aid. It may also be that for an aid to be accepted (in the sense of used) their agreement is all that is needed and that disagreements elsewhere in the organisation are irrelevant.

An alternative argument is that in organisations few decisions can be imposed by dictate alone and instead "individual decision makers pursue their objectives by making deals ... to form a coalition capable (within the rules) of making decisions favourable to its members" (March, 1994, p. 152). Also openly resolving differences of opinion can lead to improved decision making (Janis, 1982) as "power struggles enhance the quality of information available to organisations, because each faction challenges the information of the others" (Weick, 1995, p. 136). Thus it is unlikely that one section of an organisation can consistently to make decisions that consistently favour themselves over other elements without triggering adverse consequences (Hirschman, 1979). Nonetheless, perhaps in combination with other situational factors, it is possible that a given decision will be made without seeking a consensus (Hickson et al, 1986).

The **external** issues include threats such as a take-over threat or less favourable trading circumstances (Lynn and Friedman, 1998). The effect of these may be drastically to reduce the scope for internal flexibility in the organisation and it may now have to do certain things in certain ways despite its misgivings. A similar external constraint could be the requirements

imposed on the organisation by powerful external stakeholders.

3.3.2 Relationship between Specific Factors and Acceptance

Using the definitions of what are held to be the specific factors developed in section 3.3.1, it is possible to clarify their respective influences on decision aid acceptance. These can be summarised as either reducing the effect of any disagreements on acceptance (**problem type, internal or external constraints**) or to increase the likelihood of disagreements and thus rejection (**certain types of decision aid**).

The nature of the problem, especially if it can be described as either a progress or an adoption decision, will influence how a given option is evaluated (Beach, 1990). In effect, the tendency to maintain current goals means that an ongoing decision is subject to less stringent monitoring and is accepted simply because it is already being done. This **may reduce the linkage between a lack of intra-organisational agreement** with the aid and the likelihood of its rejection.

Three approaches to decision aiding were identified in section 2.5.1, and section 3.3.1.2 argued that the more the decision aiding process is technologically based then it is likely that the **difference of opinion as to the validity of the aid may be sharper** merely due to this. In effect it becomes disagreement with the aid not the decision. In the decision aid as process approach, differences may still exist but the reasons will be closer to the usual ones for any decision making - disagreements over problem formulation and the validity of the proposed

solution - and may become divested of their technical aspect.

Finally several situation-specific factors were identified which may also influence acceptance.

An important issue is the question of power in the organisation and the extent to which this allows certain groups to adopt a particular course whatever the views of others in the company.

In summary the expectation is that the situation specific factors are either external constraints (crisis or regulatory pressure) which limit internal flexibility or the effect of power relationships on internal decision making. The outcome, again, will be to **lessen or reverse the expected association between disagreement and rejection.**

Of the factors described as specific, two (problem type and situation-specific factors) may disprove the hypothesis in section 3.2.3 that *cognitive and social factors are sufficient to explain acceptance*. The effect of the decision aid is more subtle and less easy to disentangle. In effect the aid may be the cause of rejection and of the observed differences. In this instance, the positive hypothesis will appear to hold but it is arguable whether the same decision solution (unaided, or differently aided) would have been rejected.

3.3.3 Key Evidence for the Specific Factors

The argument developed in section 3.3.2 is that the specific factors will alter the basic relationship between agreement and acceptance that underpins the generic factors model. This section identifies just what evidence will discriminate between the specific and generic factors.

From section 3.3.2 the expectation is that the problem situation and the issues specific to the particular instance may lead to acceptance despite disagreements. On the other hand the effect of the decision aid may be reported in the same way as the expectations of the generic factors - disagreement and rejection - but the reason for this will be less the problem representation as such and more the way in which it has been represented.

The argument developed in section 2.4.1 makes an important distinction between problem types as whether or not it represents a new situation. This distinction is described by Beach (1990) as either an adoption decision (for a new situation) or a progress decision (for an ongoing situation). Thus the first empirical aim must be to distinguish between these two. The resultant expectation is that in a progress instance there may still be differing assumptions as to the validity of the decision aid but these may not lead to rejection. As a result, the key evidence that **problem type does have an influence** on acceptance will be a situation which is described as a progress decision, where there is disagreement with the aid but it is still accepted and in use. The expectation is that this will be reported in terms that imply that the current status-quo is acceptable even if there are ongoing concerns.

Evidence for this distinction between adoption and progress decisions will be sought in how the decision situation is described by staff in the organisation. Thus where stress is placed on a basically stable situation then this would be described as a progress decision.

Decision aids have been split into three types in section 2.5.1. The expectation is that an aid

that has a high technical content maybe more likely to be rejected than a process that is more easily understood by the participants. In effect distinguishing this from the generic factors will be difficult but the key evidence will be indications that the **disagreement is with the validity of the decision aid** not the problem representation.

Evidence for distinguishing between the problem representation and the linked aid will be found if there is a situation where there is agreement about the structure of the aid but not about the validity of the outcomes. If the aid is seen as a reasonable representation of a shared problem within the organisation then there should be general agreement about its structure. However, validity is more a construct of the value of the outcomes to certain individuals and this may still vary. If it does, then it does not imply disagreement with the underlying problem representation but instead with the workings of the decision aid.

For those factors identified in section 3.3.1.3 as relevant to the particular situation, there is an expectation of again finding **disagreement with the aid but also its acceptance**, whether because the aid has been imposed due to internal power relationships or that external constraints leave the organisation with little choice. The difficulty is that this relationship between disagreement and acceptance is also hypothesised for a progress decision so there is a need to distinguish between the two. This will not be reflected in the outcome, so an important way of distinguishing between the inertia in a progress decision and pressure from internal or external constraints would be to find an adoption situation (where there is no sustainable status-quo) in which an aid is accepted despite misgivings.

Defining the effect of power can be simplified to uncovering if there is an overall pattern of disagreement but an aid is accepted. This can then be attributed to internal power relationships if agreement is associated with the groups characterised in table 3:3 as owners or advisers rather than other staff in the organisation. In this instance the aid may have been imposed.

3.4 Summary

This chapter has taken the material in chapter two and sought to formulate two alternate hypotheses that might explain reasons for the acceptance of decision aids in organisations by separating the cognitive and social factors from other influences. As a result, this chapter has elaborated most of the issues identified in table 1:1 to construct a model which can now be tested. The dynamics influencing acceptance have been separated into generic and specific factors (sections 3.2 and 3.3) and the empirical findings that will confirm which set of explanations have been specified. Sections 3.2.3 and 3.3.3 have identified what will be the key pieces of evidence for each of the potential influences, and these are summarised in table 3:4:

Table 3:4 Evidence and Hypotheses

Hypothesis:	Key Item of Evidence:
Generic Factors	Will be disproved if find instances of disagreement with the decision aid but the aid is still in use .. in this case there is not simply a relationship between agreement and acceptance.
Problem Type	Will be proved if find an instance of a progress decision with an aid with which there is expressed disagreement but it is still in use;
Decision Aid	Will be proved if there is evidence that the reason for disagreement is with the aid itself rather than the problem representation;
Specific Factors	Will be proved if there is evidence either that a given approach to decision aiding is being imposed or that the organisation sees itself as having little choice but to operate in a given way due to external constraints.

CHAPTER FOUR: RESEARCH STRUCTURE

"Various philosophies or conceptions of the world exist, and one always makes a choice between them. How is this choice to be made?" (Gramsci, 1971, p. 326).

4.1 Introduction

Chapter three has organised the various factors that might influence the acceptance of decision aids in organisations into the two alternative theories outlined in sections 3.2.1 and 3.3.1 and summarised as table 3:4. The aim of this chapter is to consider how to test these by gathering the data needed to discriminate between them. As chapter three stressed the need for information on intra-organisational agreement and about the specific factors to understand the influences on acceptance in each particular instance, then these issues must lie at the heart of any research methodology adopted.

In table 1:2 (p. 16), it was suggested that the empirical stage needed to produce data which would:

- capture what each individual thinks about the structure and validity of the decision aid;
- reflect any situation specific factors;
- support a judgement as to the degree of acceptance and agreement with the aid and the relative importance of the generic or specific factors in underpinning this.

The lack of prior research into the acceptance of decision aids, besides affecting how the basic

literature review was conducted, also had an impact on the design of the empirical investigation. In particular, two constraints followed from this:

- First, there was a need to start with a process of theory-building and, as a result, to gather empirical data while developing the basic theory. This resulted in some of the earlier case-studies not addressing issues that were subsequently seen as important;
- Second, there was no widely agreed method seen as appropriate for this research question. This has had an impact on the structure of this chapter, which starts with a background review of a variety of philosophical and methodological concerns before describing how it was proposed to conduct this research enquiry.

In effect, at the start of this research there were various influences and pressures on how the research might be structured. For example, decision making research has often preferred quantitative, experimental, approaches and this has been a feature of some existing studies into the acceptance of decision aids (eg Bronner and de Hoog, 1983; Timmermans and Vlek, 1992; 1994). By contrast, social cognition research (especially in organisational settings) has tended to be dominated by qualitative, case-study, approaches (Spender, 1998) which can have a quantitative element embedded within them (eg Daniels et al, 1994).

Resolving these competing concerns as to the research approach was not easy. In effect, the dominant field on which this thesis rests (cognitive studies of decision making) has a tendency to experimental approaches but other factors, such as the organisational dimension, the need to encompass theory-building and the usage of ideas from social cognition, all tend to emphasise a qualitative case-study structure.

Besides needing to resolve such overall concerns, the model developed in chapter three means that the research methodology will need to yield (table 4:1):

Table 4:1 Goals for the Research Design

1.	a measure of internal agreement with the decision aiding process;
2.	data whether this agreement is with the structure or the validity of the decision aid (or both);
3.	a measure of how shared this agreement is, and, in particular, whether it is shared evenly across the organisation;
4.	data as to whether there is greater in-group than between-group agreement;
5.	data as to whether table 3:2 is a valid description of the different relationships with the aid;
6.	information as to whether those closer to the aid really do describe it in different terms to other staff;
7.	data as to the type of problem being dealt with, is it a progress or an adoption decision?
8.	data as to the nature of the decision aiding approach in use;
9.	information about external influences on the organisation.

The rest of this chapter considers how to structure the empirical enquiry to test the assumptions in chapter three. To do this means first placing the research into a philosophical context (section 4.2.1); how to interpret the empirical data (section 4.2.2); the value of quantitative or qualitative enquiry techniques (section 4.2.3) and the practical implications of conducting any research in an organisational setting (section 4.2.4). Research methodologies used in related fields are then considered in section 4.2.5 and contrasted to see if any will deliver the type of information sought here.

In turn, section 4.3 outlines the basic research design structured using a qualitative case-study

enquiry. Issues for data gathering included how to represent the individual cognitive representations (section 4.3.1), how to compare these (section 4.3.2) and how to gather data on the specific factors (section 4.3.3). The main method used to interpret the data was pattern matching (Yin, 1994), and this was used to distinguish between the generic and the specific factors identified in chapter three (section 4.4). In summary, table 4:2 outlines the various influences on the subsequent choice of research methodology:

Table 4:2 Influences on the choice of Research Methodology

Influences on this research			
Previous research in same or similar fields		Nature of the research question	
Implications for choice of methodology			
Conducting organisational research			
Experimental or Naturalistic approach (and philosophical implications)			
What methodology is suitable?			
Quasi-experimental?	Survey?	Case-Studies?	Other?
How to conduct the research?			
Methods which support theory-building			
Methods which elicit individual cognitive representations			
Methods to compare these representations			

4.2 Context for the Research

4.2.1 Philosophical Implications

Easterby-Smith et al (1991) identify three reasons why clarifying the philosophical orientation is

helpful in the conduct of organisational research:

- it helps place the research in a context especially in terms of evidence gathering and interpretation;
- it helps with research design, especially through understanding the limitations of particular approaches;
- it helps with being able to adapt research techniques between disciplines.

In effect, being clear as to the implications of the philosophy adopted clarifies what can and cannot be claimed as a result, either by the researcher or a subsequent reader. This section considers three broad approaches to the philosophy of science, which can be summarised as:

- **Positivistic** (or empirical) approaches that rely on "a logically unified body of knowledge, ideally as a closed, axiomatic, deductive system in which propositions can be derived from theories describing empirical facts" (Bem and de Jong, 1997, p. 8);
- **Phenomenological** approaches diverge from this in taking a view that "reality is socially constructed rather than objectively determined" (Easterby-Smith et al, 1991, p. 24);
- **Marxist** approaches can be described as a hybrid of the two. They share with the phenomenological approaches an argument for a socially constructed reality in that "the ideas of the ruling class are in every age, the ruling ideas" (Marx, 1846, quoted in Augoustinos and Walker, 1995, p. 292). However, they often claim that there is an objective reality, just that science in capitalist societies does not achieve this.

4.2.1.1 Positivist Approaches

The **positivist approach** is based on an assumption of an external reality observed by a neutral researcher. The consequence is that if science is conducted effectively then what is observed is the true nature of the phenomena under investigation. Within this there is an emphasis on facts

and causal relationships resulting from controlling any independent variables (Banaji and Crowder, 1994). Central to this argument is the idea of an “approximate truth” (Psillos, 1999, p. 70) which can be uncovered through the interpretation of data.

Banaji and Crowder (1994) suggest that positivist research will often break an area of enquiry down into manageable propositions that can individually be tested empirically. A consequence is that science is often constructed through a series of small scale interventions from which a theory can be built up.

4.2.1.2 Phenomenological Approaches

This tendency to study discrete elements of systems has been criticised as the “parts have no independent existence as parts and that there is no one correct way of dividing a whole up into parts because it depends upon which particular aspect of the whole is being studied” (Willig, 1999, p. 45). However, **phenomenological approaches** differ not only in taking a holistic approach towards the matter under investigation, but also the process by which events can be interpreted. For example, Sokolowski (2000) proposed a definition that “phenomenology insists that identity and intelligibility are available in things, and that we ourselves are defined as the ones to whom such identities and intelligibilities are given. We can evidence the way things are” (p. 4).

This definition leads to a central debate within phenomenological approaches about how the

individual represents external factors (Nightingale and Cromby, 1999). On one hand the argument of a personally constructed reality can be taken to the point where there is nothing left but private beliefs, in the tradition of Descartes. However, the results of taking this approach to explaining events have been described as “incoherent and fundamentally mistaken in its consequences” (Nightingale and Cromby, 1999, p. 221). Sokolowski (2000), for example, warns of a danger that “because evidencing has to be done by us, we may easily slip into the belief that it is “just” a subjective event” (p. 162). As a result there has been a revision of Social Constructionist arguments to accept that there are abstract and concrete facts, and the contextual element is the use of language to describe these items.

Spender (1998), follows Vygotsky (1962), in arguing that language is the process by which external factors and information are internalised as well as shaping thought and memory processes. In this he takes a view that the nature of any experience is defined through the language available and that this, in turn, is expressive of the nature of what is observed. Butt (1999) to some extent disagrees and, stresses that there is a danger of assuming “experience is thoroughly malleable: that we could experience things totally differently in a different linguistic community” (p. 128). However, there is a considerable amount of evidence from cross-cultural studies that it is precisely differences in available language that is reflected in the perception of the experience. In effect, the available language influences how events are described and categorised, especially our ability to move from experiencing events to judging their implications (Sokolowski, 2000).

To deal with this difficulty in phenomenology, Bem and de Jong (1997) elaborate a subject-object relationship with the latter forming the concrete elements while "beliefs are tools for dealing with reality" (p. 78). They suggest a two-tier process where the language and ideas used are culturally determined but the objects being described are real and concrete. This distinction between facts and judgement is critical in discriminating between what is a personal interpretation and what is real, as "an opinion or a judgement is usually attached to someone whose proposition it is, while a fact is not a possession of anyone in particular, it is there for everyone" (Sokolowski, 2000, p. 101). For example, external examiners and decision aids do exist, even if how they are described is personal and reflects the language available.

Overall, within phenomenological approaches, Butt (1999) suggests that it is the individual's perception of events which holds the key to understanding human interpretation of the external world. Willig (1999) adapts this to argue that "the social environment cannot be reduced to an objective, external set of stimuli; instead it is the social conditions of life *as appropriated by the individual* that contributes his or her environment" (p. 41).

4.2.1.3 Marxist Approaches

Some elements of **Marxist philosophies** of knowledge and belief share the relativism of phenomenology but claim this applies only to non-socialist science - "there can be no impartial social science in a society based on class struggle. In one way or another all official and liberal science defends wage-slavery ... {Marxism} is comprehensive and harmonious, and provides

men with an integral world outlook irreconcilable with any form of superstition" (Lenin, 1913, p. 23). In this context, empiricism is perfectly correct in its assumption of an abstract reality, just that its practitioners use an incorrect conception of reality.

Gramsci (1971) developed this argument beyond just seeing ideas as imposed by the social structure of society, as "in acquiring one's conception of the world one always belongs to a particular grouping ... we are all conformists of some conformism or other" (p. 324). In this he moves beyond traditional Marxism towards what would now be seen as a typical social constructionist world view. Augoustinos and Walker (1995) suggest that some of the reasoning behind Gramsci's work predates modern social cognition in being "socially and historically contingent, subject to change given political and historical transformations ... contributing to the stock of commonsense knowledge which people draw upon to make sense of their social world" (p. 294). Gramsci's arguments about the hegemony of ideas in society, and how to change them, implies that "struggles over the adoption or rejection of social forms as complex and wide-ranging as capitalism or socialism are won or lost in the cognitive domain" (Jost et al, 1999, p. 92).

4.2.2 Gathering and Constructing Knowledge

Aspects of the debate between different philosophical approaches result in different perspectives as to the **nature of knowledge** and what **knowing** something means. Sokolowski (2000) suggests there are two forms of knowledge. One is the process of verifying an assertion

(*knowledge of correctness*) and the other is the knowledge that results from encountering an unexpected event (*knowledge of disclosure*). It is the former which is the traditional focus of scientific enquiries (however conducted) with the format of a proposed hypothesis, its testing and the interpretation of the results. However, the latter can be the trigger to a formal enquiry (“*why did that happen?*”), can occur during an enquiry (*luck*) or form the bridge to the next stage of theory-building.

In seeking the knowledge of correctness within a scientific enquiry, consideration must be given to concerns of **validity, reliability and generalisability**. These have different meanings depending on the philosophical orientation of the researcher (Easterby-Smith et al, 1991), and, possibly, of the reader. This is sketched out in table 4:3 and discussed in sections 4.2.2.1 and 4.2.2.2 below.

Table 4:3 Reliability, Validity and Generalisability (Easterby-Smith et al, 1991, p. 41)

Positivist viewpoint	
<u>Validity</u>	does an instrument measure what it is supposed to measure?
<u>Reliability</u>	will the measure yield different results on different occasions (assuming no real change in what is to be measured)?
<u>Generalisability</u>	what is the probability that patterns observed in a sample will also be present in the wider population from which the sample is drawn?
Phenomenological viewpoint	
<u>Validity</u>	has the researcher gained full access to the knowledge and meaning of the participants?
<u>Reliability</u>	will similar observations be made by different researchers on different occasions?
<u>Generalisability</u>	how likely is it that ideas and theories generated in one setting will also apply in other settings?

4.2.2.1 Data Gathering

The concerns of validity and reliability can be seen as issues central to how an enquiry is conducted to gather the required data.

Validity is perhaps the test that varies most markedly between the two perspectives. Since positivism assumes a correct answer does exist, then the aim of the research tool must be to measure exactly (or as exactly as possible) what is sought. Phenomenology assumes that the answer depends on the context in which it is elicited, and interpreted, and thus the aim is to gain such knowledge in a way that makes it clear what the original context was. However, despite this apparent difference there is also a strong similarity - both require the researcher to gather the data in as rigorous a manner as possible, whether the rigour is about accurate measurement of an observable fact or accurate rendition of the contextual basis of the interpretation of the situation.

Reliability, on the other hand is apparently more similar between the two traditions. In both, the emphasis is on the ability to repeat the investigation and to reach broadly similar results assuming similar causal factors.

4.2.2.2 Data Interpretation

Generalisability is, in effect, the process of moving from observed items of data to develop

explanations and theories (Sutton and Shaw, 1995). One of three logic systems can be used to build and test arguments from observed data:

- *deductive logic* is the creation of a series of axioms that, if the underlying premise is true, must lead to a correct conclusion. The key to this process is one of arguing logically from known facts;
- *inductive logic* accepts a weaker link between the presented conclusions and the available facts. Here stages in the argument must be assumed and are often expressed statistically as probabilistic reasoning;
- *inferential logic* is reliant on context, if an event occurs in one context then a certain conclusion may be drawn.

Deductive logic is dependant on known facts and known causal links if it is to work. What is central is the strength of the process of logical reasoning and deductive axiomatic logic is usually connected to a positivist philosophy.

Approaches using *induction* accept a gap between the facts and theory as opposed to a logical line of reasoning linking the two. In quantitative enquiries the gap is filled by using statistical reasoning and the nature of the experimental domain. Banaji and Crowder (1994) argue that when "a correctly designed experiment yields a relationship under specified conditions, ... faith in the existence of that relationship is increased" (p. 299).

Inferential logic, however, links to a phenomenological view, and of an individually constructed reality. The argument is that what matters is preserving the original context, and the process of interpretation, to allow the user to judge the validity of an argument. There is a need for clarity about how the data has been organised into an explanatory model and this puts

particular stress on data analysis and interpretation. One major problem is to control the extent to which the data becomes subject to the researcher's interpretation and understanding (Jenkins, 1998) as opposed to reporting the interpretation placed on events by the interviewees. Various techniques, such as **respondent validation** (Bryman, 1989), can be used to confirm that there are no misunderstandings of the raw data between researcher and participant, by, for example, returning transcripts of interviews for checking.

Yin (1994) suggests that **Pattern Matching** is a particularly useful tool for structuring the interpretation of qualitative data. One way to apply this is initially to identify the independent variables and the theorised relationship between these and the dependent variables before conducting the empirical work. Thus the process of interpretation reports on the extent to which the observed data follows or contradicts the hypothesised relationships. A useful variant is to develop two rival theoretical relationships and then use the empirical data to test which is the most plausible. This is discussed in more detail in section 4.4.

4.2.3 Quantitative or Qualitative Research

This section explores **different reasons for adopting quantitative or qualitative techniques**. Which philosophy is adopted leads to a preference (sometimes an insistence) on either quantitative or qualitative (sometimes described as either experimental or naturalistic) research approaches. So positivistic researchers tend to use experimental quantitative tools while those from a phenomenological perspective may prefer case-study qualitative approaches. However,

this divide is not rigid, quantitative researchers accept the benefits of case-studies in certain situations (just they remain cautious about what can then be subsequently claimed) but see this as a stepping stone to a quantitative enquiry. Phenomenological researchers accept the value of qualitative approaches as the most appropriate style of enquiry due to their acceptance of a constructed reality (Nightingale and Cromby, 1999) but it is also possible to find quantitative approaches embedded within an investigation that is basically qualitative (Yin, 1994).

4.2.3.1 Quantitative Approaches

Experimental, quantitative, approaches demand control over the variables under consideration (Bryman, 1989) to satisfy the concern for reliability. Banaji and Crowder (1994) believe the prime aim of using a controlled experiment is to gain internal validity to form conclusions about the relationship between the dependent and independent variables. This, they stress, is an essential precondition as:

"other methods such as surveys, case studies, naturalistic observations etc., are useful and at times indispensable tools but they rarely, if ever, can provide an explanation. They can describe and even predict, but experiments and quasi-experiments are the surest and most efficient way to explain a phenomenon" (Banaji and Crowder, 1994, p. 297).

In effect their argument is that it is only through the control gained by experimental approaches can the issue of causality be handled (Bryman, 1989). Since purely deductive logic can rarely be applied, even when the data is gathered in an experimental setting, there is a subsequent linkage between experimental approaches and quantitative methods of data analysis. In effect,

statistical reasoning substitutes for the weaker logic chain otherwise inherent in inductive reasoning.

In an organisational setting, pure laboratory-based experiments are rarely feasible and, as a result, quasi-experimental approaches are often adopted. Here external variables are dealt with perhaps by using control groups (Bryman, 1989) or multiple-testing over time (Easterby-Smith et al, 1991). However, according to Bryman (1989) quasi-experiments can involve significant compromises in their design to ensure access and adapt to the internal politics of the organisation, and he concludes:

"it is also the case that field experiments frequently fail to exhibit an adequate level of internal validity (for example because random assignment may not be feasible or acceptable to the host firm). Thus the lure of field experiments as exhibiting greater external validity, because they are located in real work settings, has to be weighed against the loss of internal validity that is often incurred" (Bryman, 1989, p. 96).

4.2.3.2 Qualitative Approaches

Overall experimental techniques have potential advantages through allowing control of key variables, replication of results and in the use of quantitative analysis techniques to help with causal reasoning. However, the need to have control over key variables does tend to limit it to situations where "the researcher has a highly structured problem with well-specified research questions or predictions" (Carroll and Johnson, 1990, p. 102). These preconditions can be a problem for research with a theory-building bias where the need is to first identify just what are the elements of the problem and to sketch out some links between the observed variables.

Theory-building research can be seen as a special case where even positivist research accepts the need to attempt to draw initial conclusions using inferential logic. For example, Pugh (1973) argues that a case-study is a valuable tool as a prior stage to building an effective survey questionnaire. Others, such as Banaji and Crowder (1994) accept that there may be a need for some exploratory research before a problem can be effectively formulated for testing under laboratory conditions.

Overall, the case for using a qualitative enquiry can be held to rest on two issues. One is whether or not the preconditions for a quantitative experimental approach exist. The second is whether experimental techniques are acceptable on philosophical grounds.

In this context **qualitative techniques** should not be seen just as a precursor to moving to use quantitative methodologies once the domain is sufficiently understood. Phenomenological researchers (eg Berkeley, 1983) argue that even if the normal preconditions for positivist quantitative research exist, there are concerns with its assumption of data and interpretative neutrality.

Issues have also been raised about whether generalising from experimental data gathered in the laboratory to the real world is possible (Huber, 1997). Banaji and Crowder (1994) counter this by arguing that "the psychology laboratory is one among many such worldly settings, not different in kind from the others" (p. 306). Others such as Carroll and Johnson (1990) and Winograd (1994) disagree, especially as the experimental tradition assumes that the decision

maker has represented the problem in a particular way and that, as a result, their responses can only be explained in those terms (Huber, 1997). This is especially marked when the decision maker is being expected to operate in a manner distant from their normal approach to decision making, as often happened in experiments involving decision theory (Berkeley, 1983).

Equally it can be the case that the assumptions of a particular theory can lead to an emphasis on a given research approach. Spender (1998) argues that the social constructionism inherent in social cognition means there is no choice but to adopt a phenomenological viewpoint and use methodologies chosen to reflect the way in which "reality is a function of individual perception" (Johnson et al, 1998, p. 143), with a focus on "the subjective way in which individuals see the world" (Jenkins, 1998, p. 232). There are several approaches available to conduct qualitative research. Yin (1994) identified four broad options (table 4:4) which are suitable if the demands of experimental control either cannot be achieved or are not sought.

Table 4:4 Relevant Situations for Different Research Strategies (Yin, 1994, p. 6)

STRATEGY	FORM OF RESEARCH QUESTION	REQUIRES CONTROL OVER BEHAVIOURAL EVENTS	FOCUSSES ON CONTEMPORARY EVENTS
Experiment	how, why	yes	yes
Survey	who, what, where, how many, how much	no	yes
Archival Analysis	who, what, where, how many, how much	no	yes/no
History	how, why	no	no
Case Study	how, why	no	yes

Overall, the case for **naturalistic, qualitative, approaches** rests on four elements:

- sometimes *not enough is known about the research problem* to allow for an effective experimental approach. This should be seen as a special case, some empirical researchers accept this, but they would argue that only limited value could be put on any subsequent findings - in effect it is a step to the subsequent testing within a quantitative methodology;
- that the *philosophical assumption of neutral data* gathered in a value-free experimental setting is flawed. This is not a reason to reject experimentalism as such, more to query the nature of the claims that data gathered in an experimental quantitative experiment is superior to that gathered by observation and field work;
- the *nature of the research question* may mean that a qualitative enquiry is the most appropriate tool, this can be particularly relevant if the underlying theory makes the assumption that the basic cause of observed behaviour is the individual's interpretation of external events;
- that it is *not always possible to generalise from research conducted in a controlled laboratory* to the outside world.

4.2.4 Conducting Organisational Research

This section considers some main features of organisational rather than social science research. Between the two domains there are similarities in methodology and of the philosophical debate, but a major difference is in gaining access to the organisation and then retaining a research focus once inside (Bryman, 1989, Yin, 1994; Jenkins, 1998). Related to this are concerns of ethics and honesty in the conduct of organisational research and control over publishing the resultant research findings (Easterby-Smith et al, 1991).

Bryman (1989) stresses how "problems of access tend to preoccupy organisational researchers a great deal" (p. 2) and this influences how research is conducted. In particular, researchers will alter enquiry techniques and research design to reduce the extent to which they intrude

onto the organisation (Easterby-Smith et al, 1991). For example, researchers with a social cognition bias (Jenkins, 1998), have modified tools from cognitive psychology so that they gather the appropriate data in the least obtrusive way. So if repertory grids are being elicited, especially if the prime goal is subsequently to compare individual cognitions, following the precepts of Personal Construct Theory in full is perhaps less important than seeking to gather a grid that is good enough for comparison.

Issues of ethics are important in all forms of research, including organisational research (Bryman and Burgess, 1994). Easterby-Smith et al (1991) identify pressure that could be placed on the researcher to reveal information gathered or to control the publication of any subsequent findings. However, there are also issues for the individual researcher about how explicit they can be with the organisation as to the true nature of their enquiries if they are to gain access in the first instance.

The organisational context can result in differences between management and social science research (Bryman, 1989) due to compromises needed to gain and retain access. However, it is less clear whether this also means that management research is a separate discipline in its own right or if it remains an application of social science research?

For example, Gerry Johnson, in a keynote address at the 1997 British Academy of Management conference, argued strongly that management research needs to move away from social science approaches and develop its own distinctive ethos. On the other hand, Easterby-Smith et al

(1991) suggest that management research differs from that for the social sciences not in the techniques used but rather that it tends to be multi-disciplinary as "managers need to be able to work across technical, cultural and functional boundaries" (p. 5). Bryman (1989) argues that the difference between management and social science research is not methodological but instead concerned with the use to which the research is to be put.

4.2.5 Previous Research Methodologies in this or similar Fields

Given the nature of the material covered in chapter two, this thesis takes ideas from four research traditions:

- research into the acceptance of decision aids;
- research into individual decision making;
- research into organisational decision making;
- social cognition research into organisational behaviour.

4.2.5.1 Research into the Acceptance of Decision Aids

The relative lack of previous research that considers the acceptance of **decision aids** (section 2.3.1) not only presented difficulties for theory development, it also meant there had been little prior testing of appropriate research designs. Indeed of the articles reviewed earlier only one (Timmermans and Vlek, 1992) reports conducted research. The others limit themselves to considering how such research might be carried out and their proposals are contradictory:

- Rohrmann (1986) suggested using a semi-experimental approach and control groups to test if using a decision aid actually improved decision making;
- Brown and Vari (1992) suggest either a semi-experimental approach or a case-study methodology to capture data in an organisational setting;
- Timmermans and Vlek (1992; 1994), follow Bronner and De Hoog (1983), in using an experimental methodology to look at the actions of individual decision makers using a decision aid for personal decisions.

In the main, these articles propose an approach akin to an experimental design and Rohrmann (1986), for example, intended to explore the acceptance of decision aids in organisational setting using a contrived situation with sufficient control to allow control of dependent variables. The exception to this is Brown and Vari (1992), who suggest using case studies to identify "obstacles to successful use of decision aids ... in technical, psychological or organisational terms" (p. 40). For them, the advantage of gaining data that reflects the interplay of the individual and situational factors outweigh the disadvantages of being able to control some variables through "contrived experiments" (Brown and Vari, 1992, p. 39). They also stress the interdisciplinary nature that is likely to be needed for such research and that the outcomes will suggest general trends rather than to prove narrowly defined aspects.

4.2.5.2 Decision Making Research

Research into the value of decision aids can be seen as a subset of research into **decision making**. Here, there is a broad split between how research into **individual decision making** as opposed to **decision making in an organisational setting** has been conducted.

Research on **individual decision making** has often remained linked to the traditional

experimental approach common in cognitive psychology (for example, see Roelofsma, 1996; Teigen et al, 1996; Mellers et al, 1998; Seidl and Traub, 1998; Selart et al, 1998). The experimental method also underpinned the development of Newell and Simon's (1972) theories of information processing and of Kahneman and Tversky's critique (1974, 1984) of Decision Theory. While not the only way to conduct cognitive research it is almost the norm, and a researcher who wishes to stand outside this needs to defend their reasons carefully (eg Winograd, 1994).

On the other hand, research into **decision making within organisations** has frequently used multiple case-studies or survey techniques (Mintzberg et al, 1976; March and Simon, 1993). The focus is often on the observation of behaviour and actions and linking these to factors such as the nature of the problem or of organisational type. Typically the outcome is to use the observed data to construct a model of the major determinants of decision behaviour in organisations (eg March, 1994).

4.2.5.3 Social Cognition Research

Social cognition research is the other major field in which this thesis is grounded. It is often concerned with how the individual rationalises their actions and interprets external events (Harris, 1994). Augoustinos and Walker (1995) identify a focus for social cognition, as "what people say rather than what people think" (p. 4). Due to the underlying theory behind social cognition (Section 2.4.2), and the constraints of organisational research, cognitive research in

organisations often takes on a different approach to traditional cognitive psychology (Hellgrun and Löwstedt, 1998). Huff (1997), for example, notes that such research is not only interested in how individual cognitions are created and maintained, but also how to **compare** them between individuals.

From this, social cognition gives access to approaches that will help address some of the central data gathering concerns of this thesis. In particular, social cognitive research not only has sought to gather and compare cognitive representations of a given issue but has done so in an organisational setting (Huff, 1990). While the nature of individual cognitive processes is a major issue within cognitive psychology (Eysenck and Keane, 1990), where it is often explored in laboratory settings (Banaji and Crowder, 1994), the need to compare them is less commonly an aim (Spender, 1998). A consequence is a need in social cognition research to address both issues outside a laboratory setting. This is discussed in section 4.3 (below).

As a result, social cognitive approaches commonly rely on case-study approaches. Since there is usually an aim to study a particular issue, this results in the use of "intensive examinations of a small number of cases rather than selective examination of a large number ... chosen more for their access to the phenomenon than for their representativeness" (Weick, 1995, p. 173).

In conclusion the four fields relevant to this research all have different research agendas and differing preferences, as:

- prior research into the acceptance of *decision aids* shows a *preference for experimental approaches*;
- research into *individual decision making* frequently *opts for an experimental approach*;
- research into *organisational decision making* commonly *uses multiple case-studies*, sometimes akin to a survey;
- research from a *social cognition perspective* usually *uses case-studies* with a focus on a few instances that show the features required.

As identified in table 1:2, this thesis needs to address three issues of: reflecting individual cognitions, the patterns of agreement between the individuals, and factors from the wider organisational environment. From the above arguments, this would appear to **bias the research approach in this instance towards that of social cognition**. Social cognition works from the individual view point (Harris, 1994), is concerned with an exploration of patterns of agreement (Huff, 1997; Jenkins, 1998) and is applicable to the organisational setting (Bood, 1998). These arguments are summarised in table 4:5 (below).

Table 4:5 Link between Research Aims and Potential Approaches

AIM TO COVER:	Individual Beliefs	Pattern of Agreement	Social Issues
Theme in Research on:			
Individual Decision Making	Yes	No	Sometimes
Organisational Decision Making	No	Sometimes	Yes
Social Cognition	Yes	Yes	Yes
Research Environment:			
Experimental	Yes	Sometimes	No
Case-Study	Sometimes	Yes	Yes

4.3 Constructing the Research Enquiry

This section moves from the broad frameworks discussed in section 4.2 to consider how best to construct the basic research design. From table 4:5 this implies a **social cognitive approach** using **case studies** as the primary data collection tool. The theory developed in chapter three emphasised the need to gather information on the extent to which there is intra-organisational agreement with the decision aid as the critical tool to discriminate whether or not the generic or the specific factors are the reason for acceptance or rejection. The balance of this section considers how to measure individual beliefs (section 4.3.1) and the strengths and weaknesses of various methodologies. It then discusses how to compare these beliefs (section 4.3.2) and finally the process which underpins the identification of relevant specific factors in each case (section 4.3.3).

4.3.1 Measuring Individual Beliefs

Several approaches exist to gather information on individual cognitive representations, some of which have been developed specifically to help with social cognition research in organisations while others have been adapted from other disciplines. This section reviews three of the main approaches: **Cause Mapping; Cognitive Mapping; and Personal Construct Theory** (Bood, 1998).

4.3.1.1 Cause Mapping

Cause Mapping (Laukkanen, 1994; 1998) relies on building up a verbal picture of the words and associations used by the individuals. These can be represented graphically or, more usually, entered into a database that contains information about the individual's cognitions.

Data gathering is a two-stage process with at first "open-ended discussions around general, yet domain relevant topics, such as descriptions of the business or its key success or crisis factors" (Laukkanen, 1994, p. 12). Certain key phrases are then selected and discussed in later interviews with the respondent exploring what they believe underlies the idea and what its implications for future organisational action is. The aim is to represent a wide variety of data, expressed in the vocabulary of the individuals, set out as causal links.

The database is usually analysed using computer packages and this analysis can have one of two purposes. When studying the actual contents of the verbal systems, data can be gathered on differences and similarities between individuals "about the prevalent levels and types of thinking" (Laukkanen, 1994, p. 18). Alternatively the focus can be on causal thinking about the organisational environment and to test for levels of agreement between individuals.

A particular problem with this methodology is that it involves lengthy and quite intrusive interviewing with two or three sessions of up to three hours each (Bood, 1998). It is of value when the aim is to uncover mental processes rather than the representation of a particular issue. Moreover, cause mapping is complex, with success largely dependent on the ability and

familiarity of the researcher with the process. In effect, it is too complex when the aim is simply one of comparing current beliefs rather than uncovering their change over time.

4.3.1.2 Cognitive Mapping

Another approach is **cognitive mapping** (Eden, 1991; 1993). This has an underlying reliance on Personal Construct Theory and Pidd (1996) argues that it is appropriate in situations where:

- the emphasis is on problem structuring and the domain is described (at least initially) in qualitative terms;
- where different views of the problem may exist;
- it is of value for tracing the evolution of an argument rather than just representing the current position;
- the problem involves exploring ill-defined representations of the future.

As a result, it is promoted as assisting with the process of problem formulation. The technique is predicated on exploring an individual's representation of the problem and the "mapping is designed to capture the realistic expectations of the client rather than what should or ought to be the case" (Eden, 1991, p. 239). In the event it was not adopted as the researcher lacked the practical skills needed for its application and interpretation. Again, it was too complex for the relatively straightforward (and essentially verbal) information sought. As with cause mapping its ability to cope with the evolution of cognitive structures, besides reporting their current state, was more than was needed in this enquiry.

4.3.1.3 Personal Construct Theory

Personal Construct Theory (PCT) argues that individuals construct a world view using their experiences and perception of the current situation. It is of particular value when it is sufficient to capture the individual's current beliefs rather than their evolution (Jenkins, 1998). This limitation is acceptable in this thesis, because, as already noted, there is no interest as to the historical reasons why a decision aid was originally accepted, what is of interest are the factors underpinning the current decision to accept or reject the aid.

PCT is described here in some detail as it is important to understand its basic structure to accept its strengths and limitations as a research tool. Kelly (1955) argued that people can create complex cognitive systems that give meaning to the world and their own actions. This range of constructs is always under modification but there is considerable reluctance to fundamentally challenge the core elements of ones belief systems (Bannister and Fransella, 1986). Finally the theory has a social element where individuals adapt and adopt elements of other people's construct systems to ease social interaction (Gammack and Stephens, 1994).

PCT does not need to be represented using the often symbiotic technique of **Repertory Grid Analysis (RGA)**. In practice though the two are often synonymous, and the advantages of RGA include forcing the verbalisation of often implicit ideas and that it is (or should be) based on the cognitive concepts of the interviewee rather than the researcher. A grid will display the following features:

- **elements** - these can be other people, inanimate objects or abstract ideas;
- **constructs** - these are the qualities used to distinguish between the elements and are the means through which external events are understood;
- **linking mechanisms** - how the constructs and elements are connected, usually presented as a grid.

4.3.1.4 Constructing Repertory Grids

Constructing a repertory grid is usually a four-stage process (Shaw and Gaines, 1987; Reger, 1990b). When eliciting a grid it is essential to start with defining the objective that forms the question posed to the interviewee. Following this, it is conventional to start with the elements. These are the items central to the domain, such as the way in which a given organisation structures its decision support for the resource allocation process. This is not just a one-off step and it is quite common for the interviewee to identify additional elements whilst deriving the constructs or on reviewing the repertory grid when it is laid out (Gruber, 1989).

Once the elements have been listed, deriving the constructs is possible, usually by writing down the elements onto cards and then randomly selecting these cards in groups of three. The interviewee is asked to decide which pair are similar in a way that is distinct from the third and to provide a verbal analysis of both the matched pair and the remaining option. This usually results in adjectival definitions of the differences, such as large-small, friendly-unfriendly, seen by the individual as opposites. Thus, a respondent could generate a construct for apples coded: red-large, if these were the key differences (that in their experience the less red an apple the larger it was). It is important to allow the interviewee to generate their own constructs as "the

elicitation of constructs from each subject individually directly reflects the emphasis within Personal Construct Theory on the idiosyncratic nature of each person's system of cognitive dimensions for interpreting .. social environment" (Adams-Webber, 1979, p. 21).

Finally, the elements are rated against each construct and this is often done by determining the position of the element on a scale (usually 1-5, sometimes 1-7) using the poles of each construct. The resultant grid will then reflect the questions that can be asked about a specific domain, and the key variables between aspects of it. An example of a repertory grid is set out below (table 4:6). This was used (in a different research study) to explore difficulties in eliciting information from different faculties in a University.

Table 4:6 Example of a completed Repertory Grid

	Acad 1 (E1)	Acad 7 (E7)	Acad 4 (E4)	Acad 3 (E3)	Acad 2 (E2)	Acad 5 (E5)	Admin 1 (E8)	Acad 6 (E6)	Admin 2 (E9)	Scale
C4	1	1	1	2	3	4	5	5	5	none-not
C3	1	1	3	3	2	4	4	4	2	no-yes
C5	1	1	3	1	3	4	3	4	5	no-yes
C6	1	1	1	3	3	2	5	4	1	no-yes
C7	4	4	2	2	2	3	2	4	4	no-yes
C1	4	5	5	4	3	2	2	1	1	no-yes
C2	1	1	1	1	1	1	3	1	3	no-yes

The elements represent the various academic faculties and major administrative units of a

University. The constructs derived from the elements are:

- C1) "the extent to which there is managerial control in the section over data provision".
- C2) "is the problem one of technology or technological skills used in the section".
- C3) "would normally expect access to the data but this is blocked".
- C4) "how much effort is needed to extract data".
- C5) "is the problem one of people blocking access".
- C6) "is it necessary to invoke the help of a more senior colleague when dealing with this area"
- C7) "do they trust us or agree with the use to which we are putting the data".

This example shows the main parts of a completed repertory grid with the various elements set out as the column headings and the constructs as the rows. On the right-hand side of each row is the scale constructed by the interviewee. The numbers (using a 1-5 scale) were then completed by the interviewee by a process of asking how true is each construct for each individual element. Thus, academic faculty #1 scores very low on the "amount of effort needed to extract the data" in contrast to faculty #6. Equally faculty #1 has a high degree of "managerial control over data provision" unlike the area identified as "Admin #2". This helps produce a taxonomy that itself can then be used to describe the domain. For example, there are broad similarities between faculties #1, 7 and 4 which differ from the two administrative units and faculty #6. Equally there are similarities in terms of effort needed to extract data (construct #4) and the extent to which the difficulty was perceived as deliberate blocking of access (construct #5).

One of the simplest ways of doing to investigate the structure of a grid is to measure **differentiation** by simply counting the number of constructs to uncover "the number of dimensions that comprise the constructive system" (Reger, 1990b, p. 307). The greater the

number of constructs the richer the revealed set of cognitions can be said to be.

Overall, as a research tool, PCT has many **strengths** including its relative simplicity and in addressing the issues of validity and reliability identified in table 4:2. Conducted effectively it is useful for recording an individual's belief system, and the structure represented in the repertory grid can be compared with other data (for example from an interview) to ensure that a full representation of their beliefs has been made. It is also "especially promising for the study of relatively small samples ... as it allows the researcher to focus on the idiosyncrasies of small numbers of cognitive maps" (Reger, 1990b, p. 308). However, there are some **weaknesses** in using it. One major constraint with PCT is that the constructs are of only limited relevance outside the situation in which they were created (Kelly, 1955). This is fundamental to Personal Construct Theory but does lead to significant difficulties in comparing the cognitions of different individuals. Overall, the limitations of using PCT (Reger, 1990b) are that:

- the *constructs are of limited meaning outside the context* formed by the question posed to the individuals, in this sense carefully framing the underlying question is very important;
- PCT is of more use when it is dealing with a *concrete rather than an abstract question*;
- it is *hard to compare repertory grids* between individuals or over time.

4.3.2 Measuring Intra-Organisational Agreement

The issues in measuring agreement in organisations are covered at some length given their importance in answering the central question in this research.

4.3.2.1 Background Issues

Within cognitive mapping techniques an important issue for **reliability** is how the actual comparisons are elicited. One approach is to allow the respondents to do this (Daniels et al, 1994), while the alternative is for the researcher to code and compare their responses (Laukkanen, 1994). The second option leads to the concern "as to how the cognitions of the recorder are separated from those of the respondent" (Jenkins, 1998, p. 243). The aim in either approach is to satisfy the requirement "have we allowed the respondent to respond in a way which is salient and meaningful to him or her" (Jenkins, 1998, p. 240)? This implies needing to address four significant issues:

- how has the *trade off between salience* (ie accurately capturing the individual cognitions) *and comparison* been made, in particular has any data been sacrificed in the search for comparisons;
- to satisfy the need for the cognitive representation to be valid it is important that it *reflects those of the individual*;
- *who codes the representation* for comparison, there is a need to retain a clear evidence trail and avoid imposing a structure;
- the *organisational and managerial context is a constraint* and to satisfy this it is essential to use "methodologies which allow the respondent to reflect their own views, in their own language" (Jenkins, 1998, p. 243).

4.3.2.2 Potential Solutions

This research has sought to satisfy these concerns by **adapting the approach developed by Daniels et al (1994)** which allows interviewees to self-report their agreement. This methodology also has the advantage that the cognitive maps (here represented as repertory

grids) can be left to reflect the individual's original perceptions of the elements, constructs and relationships without the researcher needing to impose order to ease future comparisons. It involves a **two-stage process of deceptive simplicity**. First the grids were generated conventionally then a **questionnaire was sent to the interviewees** asking them to rate each repertory grid as to "the similarity of the maps to their own mental model" (Daniels et al, 1994, p. 23).

Thus the grids could retain the basic precepts of PCT and reflect the cognitive map of the individuals whilst the comparison was undertaken using a different approach. Various statistical tests were then applied to the questionnaire results to see if there was greater agreement with the grids of others who were closer in work function or employed by the same company. **The repertory grids themselves were never directly compared.**

4.3.2.3 Limitations in Proposed Research Design

The use of repertory grids is a relatively simple solution to a central goal in the research design of representing individual beliefs as to the nature of the decision aiding process and to form a baseline for their comparison. Daniels et al (1994) overcame some difficulties in Reger's (1990a) original approach through not directly comparing the grids and instead used a questionnaire to allow the interviewees to self-report their agreement with other people. However, Hodgkinson (1997) in a review of various applications of cognitive mapping techniques to understanding different representations between people found that "studies which

have revealed diverse mental models of competitive structures have, on the whole, tended to use research methods which, by their very nature, may accentuate surface-level differences in cognition at the expense of fundamental commonalities” (p. 645). He suggests that the reason for this is twofold:

- **first**, the studies are seeking data on individual differences and thus the differences which are revealed maybe a product of the research design and “the dynamics of the interview and associated methods used to elicit and represent the research participants’ mental models” (Hodgkinson, 1997, p. 645);
- **second**, is the choice of the particular features that will form the basis of comparison, for example, Reger (1990a) reports significant differences between individuals, but when she reviewed the same dataset, using different tools, revised this conclusion to suggest there were similarities in the mental frameworks between groups (Reger and Huff, 1993). Further to complicate this picture, neither Daniels et al (1994) nor Hodgkinson (1997) agree with Reger and Huff’s second set of conclusions.

Hodgkinson offers no solution to this concern noting instead that “the most complex set of issues is related to the problem of how actors’ mental models should be compared with one another” (Hodgkinson, 1997, p. 650). In this research design it was proposed to seek to control for these concerns in two ways:

- A **partial control** is to gather the data twice, once during an unstructured interview where the interviewee is allowed to set out their own beliefs as to the nature of the decision aiding process within the organisation and then again using a repertory grid. This material can be analysed separately to the questionnaire and, at the least, forms a crosscheck that the degree of agreement or disagreement revealed in the questionnaire can be substantiated;
- When dealing with the interviewees **to seek to minimise** the extent that they feel that the researcher is interested in differences between people rather than their individual perceptions.

4.3.3 Uncovering the Specific Factors

As was suggested in chapter three, the specific factors were seen to be the nature of the problem (especially whether it was new or not); nature of the decision aid in use; and issues specific to the particular situation. Gathering data on this aspect of the research question has been **essentially qualitative** relying on interviews and observation to identify which factors are present in which instance.

Chapter three identified three major potential influences which were collectively described as the specific factors:

- the nature of the problem, whether it is new or ongoing;
- the nature of the decision aid, in particular how technological it is;
- internal or external constraints on organisational freedom of action.

Each of these needs to be identified and then fitted to the theoretical descriptions originally developed in chapter two and converted into testable propositions in chapter three (section 3.3.3). The existence of the specific factors have been identified by the researcher from notes and tape-recordings taken whilst in the organisation (and mostly gathered during prearranged formal interviews). As such the interpretation has been strongly influenced by a process of constructing order from such notes (Mason, 1994; Potter and Wetherell, 1994; Turner, 1994). More information on how these attributions were made in the context of each case is in chapters five and six as appropriate.

4.4 Interpreting the data: Pattern Matching

In consequence the **approach used** to describe the specific factors was another example of **pattern matching**. Here the process was to fit the descriptions of features such as the decision aiding process in use or the nature of the problem to the theoretical structures constructed in section 2.5.1 for the decision aid and section 3.3 for the other specific factors. The information was mainly drawn from unstructured interviews and a degree of observation and consideration of other written material supplied.

Pattern matching relies on linking observed data to the findings predicted in the earlier model(s). In this research then, the simplest test of which model in chapter three is the best explanation, is the relationship between agreement and usage of the decision aid. However, more realistically there are a series of steps needed before this can be achieved. Having now set out the planned structure of the research enquiry, it is possible to be more precise about how the assumptions in table 3:4 can be tested (table 4:7):

Table 4:7 Evidence for Main Assumptions

a measure of internal agreement with the decision aiding process;	Verbal statements, structure of repertory grids, responses to questionnaire;
data whether this agreement is with the structure or the validity of the decision aid (or both);	verbal statements, responses to questionnaire;
a measure of how shared this agreement is, and, in particular, whether it is shared evenly across the organisation;	verbal statements, structure of repertory grids, responses to questionnaire;
data as to whether there is greater in-group than between-group agreement;	verbal statements, structure of repertory grids, responses to questionnaire;
data as to whether table 3:2 is a valid description of the different relationships with the aid;	verbal statements, analysis of questionnaire;
information as to whether those closer to the aid really do describe it in different terms to other staff;	how is the aid described verbally, are any patterns revealed by the questionnaire returns;
data as to the type of problem being dealt with, is it a progress or an adoption decision?	how is the situation described verbally - are phrases such as "steady-state" used?
data as to the nature of the decision aiding approach in use;	how is it described by the interviewees, what level of IT-dependence is observed?
information about external influences on the organisation.	how is this presented by the interviewees either verbally or in the repertory grids?

4.5 Summary

The research methodology that was finally adopted was of a **series of case-studies**. Within this there was use of deductive logic in moving from the repertory grid and questionnaire data to the reported conclusions about the degree of intra-organisational agreement and of inductive logic in moving from interview data to assumptions as to the nature of the specific factors. In terms of the issues originally raised in table 1:2, and refined in table 4:1, the design set out in table 4:7, can be summarised as (table 4:8):

Table 4:8 Summary of Research Design

Original Aim:	Achieved By:
Individual view about the structure and validity of the decision aid.	Interviews and Repertory Grids.
Nature of the specific factors.	Interviews and Observation.
Degree of intra-organisational agreement with decision aid.	Repertory Grids and the Questionnaires.
Relative importance of generic or specific factors in determining acceptance or rejection of the decision aid.	Subsequent analysis of the findings using Pattern Matching

The empirical fieldwork for the thesis is reported in chapters five and six. The logic for this division is that the material reported in chapter five was gathered during the theory-building phase. This saw a development of how the research question was understood and experimentation in how best to explore this. As the issue of individual differences came to the fore, this led to a need to use an approach that made measuring these a central element. This led to the basic research design described in table 4:8 and used in the case-study reported in chapter six.

CHAPTER FIVE: THEORY BUILDING DATA

5.1 Introduction

This chapter draws together material gathered from the case-studies conducted in the theory-building phase. These studies were particularly helpful in clarifying the theoretical basis of the thesis and exploring the different ways in which this could then be tested. However, in terms of what was finally sought after the initial theory-building process was complete, there are **weaknesses** in these cases. In particular none sought specifically to capture and compare the cognitive representations of the individuals using either Repertory Grids or any of the other tools reviewed in sections 4.3.1 or 4.3.2. Despite this, the evidence gathered could still be presented in the terms summarised in table 3:4, to uncover whether the specific or generic factors were the cause of acceptance or rejection in each case.

A particular value to these studies was that they forced a reappraisal of what forms a decision aiding process, as opposed to the narrower definition originally used by Cook (1992) that a decision aid was a system labelled as such and which directly informed subsequent decision making. The reformulation led to an acceptance that there would be a split between how decision aiding was organised and the subsequent decision making, and also that decision aiding was not synonymous with IT.

Another feature of these cases has been a process of striking an appropriate balance between concentrating the enquiry on the decision aid or on the decision process. Two of the cases in

this chapter, because they use the initial formulation of what was expected to be a decision aid, virtually ignore the surrounding decision situation. The final instance reported here, in part due to the way in which the decision was aided, lacks a focus on the aid and concentrates on the decision. As with other short-falls in these cases, this was important in forcing a re-evaluation of what was sought in the empirical studies, and thus the style of research enquiry advocated in chapter four and was subsequently applied to the study reported in chapter six.

For convenience the three case studies are coded, and described in this chapter, as:

Table 5:1 List of Case Studies

Case Study:	Timing	Details:
A	1994	Small financial services company
B	1996	Small service company (hairdressers) with a training school attached
C	1995	Further Education College which has recently introduced HE Level work
Note that two distinct interventions occurred in Company B, these are referred to as B1 and B2 where appropriate.		

The balance of this chapter is taken up by briefly describing the conduct and findings of each of these cases. This data is then compared with the template set out in table 3:4 to identify which factors were the cause of acceptance in that particular instance. Subsidiary data for all the case-studies is in annex one.

5.2 Background Information

5.2.1 Case-Study A

This was the first case-study undertaken within the thesis and was started when even the most basic literature review had not been completed. As a result, issues that were subsequently identified as important were not addressed. One advantage, though, is that it was conducted intermittently over a period of nine months and this allowed a longitudinal study of the process of problem formulation, alteration and solution implementation.

5.2.1.1 Nature of the intervention

The basic approach used in this case was very close to Action Research in that the involvement with the company was to design software to automate their existing data-management systems. Action Research is not a methodological technique as such but is characterised by the relationship between the researcher and the subject. Typically such an enquiry "is explicitly concerned with problem-solving, but also contributes to our understanding of .. the effects of organisational structure .. carried out in a participative climate" (Bryman, 1989, p. 183). This style of intervention was unintentional and the consequences form a significant limitation to using the findings. The results can be expressed using the relationships set out in table 3:4, but the main value of this case was to force a reappraisal of what decision aiding in organisations actually consists of.

5.2.1.2 Background Information

The company was quite small (eight employees) with a London office and a head office in the Cayman Islands and managed portfolios of funds and bonds for private clients. After an initial interview, direct contact was limited to the manager of the London office and intermittently the chairman. They had sought external help as they had a problem with their existing manual procedures that they lacked the technical skill to solve themselves. In particular, they were seeking to improve their **ability to report performance** both internally and to their clients, and to handle currency fluctuations affecting non-US shares.

Designing the system involved **two major cycles** with an initial stage of the designer working with material supplied by the company to develop a basic prototype. After installation, this model was substantially redesigned with further refinements and modifications over the following six months. At the end of the second stage it was agreed that future alterations could now be handled within the company. In many ways this was a relatively straightforward process of **solution design and implementation** which was **cyclical** and options became clear to the client as the process advanced. Also there were two levels of expertise at play - client (financial), designer (software) and this led to different perceptions as to what should be included and how it should be represented. At the end these two viewpoints largely coincided, particularly once responsibility for maintenance and development of the software was passed over to the company itself. Further details are in section A of annex one.

5.2.2 Case-Study B

This shares much with case A as to the reason for the involvement with the company and how this, in turn, influenced the investigation. In this case two separate items of software were developed, one to improve financial decision making and the second a database to improve customer management.

5.2.2.1 Nature of the intervention

The data reported here is from this initial involvement but an important difference between this and case A is that it was originally intended to develop into a full research enquiry. However, it subsequently proved impossible to negotiate further access. One difficulty with organisational research is that it leaves the researcher vulnerable to what Easterby-Smith et al (1991) describe as "conflicts that may be far deeper and more complex than will be evident to a relative newcomer in an organisation" (p. 64). This enquiry is a good example of this, as research access was lost because of a shift in the balance of power between the son (who wanted change and was prepared to support the research) and the parents (who had had quite enough of both change and outsiders).

5.2.2.2 Background information

The company again was small, and was a family firm run by the two parents with one of their

sons. A wider consultancy had uncovered weaknesses in the quality of financial information and in record-keeping in respect of customers. One recommendation was for greater use of IT to support their information needs and, again, the company lacked the in-house expertise to design the necessary systems.

Despite the loss of full access this case is valuable as it represents an instance where two different decision aids were introduced at a six-month interval but met with different receptions. One possible reason for this was that the first piece of software was delivered and installed whilst the main consultancy was still active and the company was facing a severe financial crisis. Delivery of the second system coincided with the end of the consultancy and with the company re-entering a period of apparent stability.

The **first instance (case B1)**, was a spreadsheet system set up when the company was facing severe financial difficulties and the son was threatening to leave and work with his brother. The system, and other changes promoted by the consultant, produced relatively quick results that could be seen in direct financial terms (a particularly important dimension to the father). Thus a combination of financial and personal pressure overcame the objections of the parents, especially the father. Details of this system are in section B of annex one.

By the time the **customer database (case B2)** was implemented the immediate financial problem had been resolved. Although elements had been deliberately written into the system to appeal to the parents, it was apparent they had reverted to their initial view that such an

approach was unnecessary (although the spreadsheet continued to be used and accepted).

When the database was checked some two months after installation it was found that no more data had been added except that imported when setting up the initial system. Here the son had, if anything, been even more enthusiastic but the database had not been adopted within the company. Implementation also coincided with the end of the active phase of the main consultancy. Details of this system form the second part of section B in annex one.

In **both cases there were disagreements** from the parents but one was accepted and used and the other not. Of overriding importance in the first instance was:

- whilst he was *not enthusiastic for any IT solution*, the financial nature of the outputs made them easily acceptable to the father;
- it had become clear that the *company was facing a severe financial crisis* unless internal financial controls improved
- this threat was compounded by the stated *intention of the son to resign*.

In case B2 the **same disputed images**, between the parents and the son, existed but without the **situational factors** that had overridden the objections in case B1. The company's short-term financial situation had improved because of a general revision of work practices and also improved monetary control. This left the son, as internal supporter, in a weakened position, although he was still committed to an IT approach and determined to bring about further internal change. However, the other pressures were less powerful, especially as the external consultancy had ended by this time.

5.2.3 Case-Study C

This involved a Further Education College that had started to develop its involvement in Higher Education (HE) work and was already the main provider of post-16 education in its locality. In common with all such colleges it had recently moved from direct control by its Local Education Authority to a position of relative autonomy. It was now directly funded by the Further Education Funding Council (FEFC), which, at this time, placed no constraint on the overall number of Further Education (FE) students that the college could recruit. Instead the number for which full-funding was available was limited and the college could recruit as many or as few in addition as it liked at a marginal rate. At the time of the visit, the college was actively expanding both the subject range and levels of its FE provision to strengthen the college's role as the primary provider of local post-16 education.

5.2.3.1 *Nature of the intervention*

The **original aim** was to review how the college constructed its decision support environment using IT and how **acceptable this had proved within the organisation**. On initial enquiry senior staff had reported that the college was developing its IT-systems and had just finished networking its various sites within the town centre. Despite this, the situation as revealed was rather different, with no serious use of IT in a decision aiding role. Instead the decision support environment consisted of colleagues, checklists and manual systems. Therefore it was decided to concentrate on how the college was organising **support for decisions resulting from its**

recent introduction of a degree programme validated by a local university. At the time of the research the college was preparing to run the third year of the degree programme for the first time and was grappling with various curricula, time tabling and staffing implications.

The data was gathered during two days of interviews in July 1995, supplemented by written feedback on the interview transcripts. The interviews were recorded in note form and transcripts checked with the individuals in writing (see section C, annex one). Besides checking the accuracy of the interview notes the follow-up letter was used to pose a subsidiary question to all the interviewees "*as to how you could see IT being used in the sort of decision processes we discussed*"? The interviewees are identified through the notation (C#) with the number referring to the appropriate individual (see table 5:2) and seven members of staff were interviewed. These occupied a variety of positions including the equivalent of departmental heads, lecturers involved in running major programmes and two members of staff from the central administration. Finally a draft report was sent to the college for comment.

The intention was to interview a number of staff of different grades, functional areas and between academic and administrative staff but with a bias towards academic managers. By this stage table 3:2 had been refined to identify the scope for differences between the users of a decision aid and it was hoped that this spread of interviews would be sufficient to bring to the surface any disagreements within the college and to help identify if these followed any discernable patterns.

Three of the staff were heads of academic departments and two were described in the college as Programme Leaders. These were staff at the level below head of department with responsibility for a particular set of courses. Of the administrative staff one worked in the student registry and the other was responsible for managing applications for external grants from local companies or the European Union.

Those interviewed are listed in table 5:2 and are described as Ci etc. in the rest of this chapter:

Table 5:2 List of staff interviewed by grade (Case C)

ID	Grade	Area of work
i	Department Head	Social Sciences
ii	Programme Leader	Business Studies
iii	Department Head	Business Studies
iv	Administration	Registry
v	Department Head	Science
vi	Administration	Company of College
vii	Programme Leader	Social Sciences

5.2.3.2 Background information

The **basic justification behind the college's decision** to commence degree-level programmes was a desire to improve take up of HE in the local area. This is a region traditionally with very low post-16 education staying-on rates and one from which people are unwilling to travel. It was felt that by offering such courses locally the college would not compete with existing Universities as the students would not otherwise enter Higher Education, described as "don't see this as competing with other local HE providers" (Cv). This aim of increasing participation was often expressed in terms of providing a complete educational experience from 16-21. So the college sought to be "providing more opportunities for education and training at all levels"

(Prospectus, p. 8) and the decision to introduce HE was seen as fitting the college's desired role in its local community (Ci, Ciii, Cv, Cvii). The importance of this was repeatedly stressed with the college seeking to be "closely linked with the local .. community" (Prospectus, p. 3) and to "want to enhance local access and provision" (Cii).

This noncompetitive approach was in contrast to their approach to the local 16-18 market where they were aware of their current dominant position but that the local Training and Education Council could seek to fund other potential providers (Cv).

5.2.3.3 Disadvantages and Advantages of the Original Decision

Some **difficulties had emerged** in implementing the organisational decision to start degree level programmes, particularly about financial accounting, staff expertise, the subsequent cap on HE student growth and time tabling.

The main burden in terms of financial accounting was the need for careful monitoring of the funds imposed by the FEFC, as they would not allow cross-subsidy from the FE work to that funded by the Higher Education Funding Council (HEFCE). This was solved through linking salary sources to teaching loads, but the college remained aware that it "must be careful not to subsidise HE with FE monies" (Cv). There were also problems of staff inexperience that did "cause some management problems, some staff lack postgraduate experience or of teaching to degree level" (Cvii). Other pressures on staff stemmed from the variety of types of students,

the demands of the funding council and "pressure on staff from writing and delivering programmes" (Ci).

Also not all course proposals had been accepted by the validating university which had turned down a BSc in Science on the basis of facilities. The department linked this with "loss of laboratory space, under pressure to improve room utilisation from external [college] tendency to create general teaching rooms from labs" (Cv). This respondent was in other ways an enthusiastic supporter of both the original decision and its implementation.

Following the decision to introduce HE work, the college (and indeed the whole sector) was caught out by the unforeseen introduction of the MaSN⁽¹⁾ which stopped further significant growth in student numbers. This was much regretted by staff, but not seen as an error in the original decision (Cii, Ciii, Cv, Cvii).

However, overall the picture that emerges is a decision to move into a new environment that has been **widely supported by the staff interviewed**. The **advantages** were cited in terms of satisfying local needs, enhanced resources and status and allowing the college to create an environment where it could offer education from 16-21. **Disadvantages were coded as temporary** (staff, student experience) **or external** (complex funding rules, the MaSN). What was also stressed was the extent to which their **actions were constrained** by their uneven relationship with the Higher Education Institution which validates their programmes. Other

¹ MaSN - Maximum Aggregate Student Number, represents a cap on the number of Full Time Undergraduate students that a Higher Education Institution can have

external constraints included the funding rules and data requirements imposed by the Further Education Funding Council (FEFC).

5.2.3.4 Nature of Decision Aiding Process

Behind these decisions was an **active decision aiding process** with considerable use of informal and qualitative criteria (Civ, Cvi) to evaluate the outcomes. This was described variously as "take a view" (Ciii) and especially for strategic choices, the importance of mixing intuition, subjective factors and some hard data, together with "hunches" (Ciii). Time tabling, for example, was seen as a manual job where IT might be of value in either identifying clashes that were to be resolved manually (Cvii) or to record the final version (Cv). The extent to which decision aiding was a social process involving the evaluation of qualitative criteria was enhanced by visual observation - only one office had a computer in it and that was turned off, in the corner and covered by a dust-sheet. However, here the respondent (Cvi) also emphasised that the section had developed its own IT based database systems to keep track of various funding applications and to provide returns for the FEFC or other sponsors.

Nonetheless, it is uncertain whether what was studied in this instance can really be described as a decision aid in the terms of table 2:5 (p. 56). Table 5:3 (below) applies that test to this instance:

Table 5:3 Is Case C a Decision Aid?

1.	A definable organisation planning process;	there is evidence for this;
2.	A recognisable problem and desired outcome;	implementing an earlier decision to offer HE;
3.	Systems for gathering information;	interpersonal both for gathering and analysing data;
4.	Systems for analysing information;	
5.	Maybe some use of IT, whether as a simple model, a datastore or more directly linked to the decision process.	no use of IT in a systematic way, but this seems to have been by choice.

In the sense of the test set in chapter two, then the process in use in case C is a decision aid. However, this attribution needs some caution in that, as suggested at that stage, it is an instance that could be seen as little other than routine organisational decision making. This led to a **major reconsideration** of what constitutes a decision aid in practice. If the gap in case A between the aid and the decision was a surprise then it was not immediately clear that the process observed in case C could even be described as a decision aid. This led to a renewed search of the decision aiding and related literature to uncover how to describe this situation. This was found in the approach to decision support advocated by van der Heijden (1996) and Beach et al (1996a) of planning and option review.

The reasons for the style of decision support used by the college were explored in a follow-up letter that also tried to test whether this was a product of the current technological state or a preferred approach. They were asked to comment on how "*you could see IT being used to assist in the sort of decision processes we discussed*" and four replies were received with the following issues identified:

- that at a local level IT could be used to assist in the generation of statistics on student outcomes and to track individual students through the college (Ci);
- as a means to improve communication within the college (Cii);
- to assist in the processing of data about student progress and to generate data to be used for subsequent decision making (Cv);
- to automate the admissions procedures and to identify timetable clashes which are subsequently resolved manually (Cvii).

The responses showed no enthusiasm for shifting away from the current method and the explanation for this approach to decision aiding may rest in their previous success. If the existing systems were seen as sufficiently robust there would be little incentive to accept the significant costs of moving to IT processes (Hinton and Kaye, 1996). Nonetheless, there remains an apparent mismatch between an organisation that presented itself as an IT rich environment (in many ways it is) but whose staff do not appear to use IT. In essence the **desired role for IT** is basic information processing with the actual decision process being supported through an interpersonal planning system.

5.3 Summary of Findings

This section summarises the main findings concerning the generic and specific factors in each case. Gathering data for the generic factors was the weakest aspect of all these cases as in no instance was an explicitly cognitive approach used to capture or compare the individual representations of the decision aiding process. Having acknowledged this, it is still possible to make some general comments using the data as gathered. Seeking to tighten this aspect of the research design led to the methodology described in chapter four and used in chapter six.

5.3.1 Generic Factors

The three case-studies reveal quite different pictures. **Company A** was homogeneous and due to the nature of the contact with the company this formed a simplified version of table 3:2 with two actors, an advisor and an owner. Staff in the Cayman Islands formed a backdrop who needed to be reassured, and occasionally raised issues, but their role seems to have been to passively to accept the advice of the owner.

Case B was a family run firm and had quite marked differences in approach between the son and the two parents. The latter had an effective power of veto, had built up the business over twenty years and saw little reason to introduce any changes. At times the son threatened to leave and join his brother if they did not make the changes promoted by the main consultant. The son had embraced the strategy proposed but it was clear that neither of the parents had the same commitment nor enthusiasm either for an IT solution or the overall process. Thus at the very least there were disagreements as to the strategic image (Beach, 1990) in the sense of how they should tackle their problems, but also on the more fundamental level of the value image (ie was there a problem). In both the instances, described as cases B1 and B2, there were differences of opinion within the organisation as to the validity of the proposed process. In both the son, as internal sponsor, was allied with the external people whilst the parents were opposed.

In **case C** there was general support for the decision to bring in HE work and for the linked aim

of expanding the scope of its FE provision. On closer inspection although this support was general, it was not always expressed in quite the same way between individuals. For example, Ci, Cv and Cvii described the benefits as bringing increased pressure on the college to improve staff-development opportunities and to improve the social arrangements for students - "HE students seem to have more ability to put pressure on the college" (Cvii). Sectional differences were apparent through "doubts about central data" (Cii) and "doubts about any data held elsewhere" (Ciii). This was seen as crucial given a need to defend plans to other bodies both within and outside the college. To satisfy the need for accuracy and confidence there was a willingness to accept the costs of duplication (Ci, Ciii, Cvii).

None of these appear to be too important and probably indicate latent areas of disagreement within the college. At the time of the interviews, the development of HE work had brought distinct advantages in terms of satisfying general and specific goals, extra resources and "brownie points" (Cvii). Overall the college's goals in this instance are widely shared, even by those who have failed to gain as much as others (eg Cv). **In summary**, if the hypotheses in section 3.2.2 are correct then the following outcomes should have been found:

Table 5:4 Relationship between Intra-organisational Agreement and Acceptance

Case	Level of Differences	Expectation	Outcome
Case A	few internal differences	accept	accept
Case B1	significant differences	reject	accept
Case B2	significant differences	reject	reject
Case C	limited differences	accept	accept

The expected relationship holds true for three out of four instances. In cases A, C and B2 there was the expected relationship between agreement and acceptance. In two (cases A and C) this was positive with general agreement with the decision aid also leading to acceptance, in the other (case B2) it was negative with disagreement leading to rejection. In the other instance (case B1) there was disagreement and acceptance (or at least usage).

5.3.2 Specific Factors

Overall these case-studies proved particularly valuable in uncovering the specific factors although the extent to which table 3:4 could be validated was limited by the way in which the individual differences were identified. This section follows section 3.3.1 in splitting the specific factors into the **type of problem, type of decision aiding process and issues unique to the situation.**

In both cases A and B the **problem type** can be characterised as adoption decisions, especially in that deciding to use an aid (and its format) was a major choice for each company. Both had made (or in the case of B had been forced to make) a conscious move towards an IT-base for these decision aids to replace manual systems that had been in use for some time. Case C can be seen as a progress decision. The college had taken its first intake of degree students some three years ago and the underlying decisions had been taken four to five years previously. The focus at this time was ongoing issues such as curriculum content, staffing, and time tabling.

For both cases A and B the **decision aids** were concerned with the automation of existing processes. In case A this was of their client and financial database to improve their analyses and its ease of use. In case B two aids were designed, one to improve their financial planning and cash-flow analysis and a second to form a client database.

As to the approaches to decision aiding set out in Section 2.5.1 both of these fit the category of model-based decision support. Importantly, both underpinned the development of the argument that a decision aid could still function as such, even if it was slightly removed from the decision making process. So in Case A the company continued to make decisions about its portfolio on the basis of advice from its financial advisers but the aid was used to identify problems with either particular client's portfolios or the company's overall equity situation. In Case B the company did not use the financial modelling software to conduct its day to day transactions but again it was used to identify a long term liquidity problem and to consider the profitability of the different aspects of the business. For case C the decision aid should be characterised as a process with formal elements such as the use of meetings and planning days with a strong emphasis on priority setting (Cii). The process was used to clarify roles and to bridge the gap between deciding on a strategy and implementing it.

Finally both cases B and C saw the influence of **situational factors**. As mentioned, **case B** involved a family firm and the dynamics between the two generations was the major determinant of the company's behaviour. At the time of the intervention this was exacerbated by the extent to which the company had an almost full-time consultant advising them on their

business practices and trying to bring about major organisational changes. The background to this was a significant cash-flow crisis and the external consultant had the effect of constraining the freedom of action of the parents.

For **case C** the most important constraints were the needs of the validating University which was seen as a (benign) limit on the college's freedom of action. In this it was described as "very supportive" (Ciii, Cv) and the relationship was perceived to be an unequal but genuine "partnership" (Ciii). However they were also significantly constrained by the various demands of the Further Education Funding Council (FEFC) which placed demands on the style of information recording in the college. As theorised in section 3.3.1.3 the **main effect of the situation-specific factors, whether internal or external, was to constrain the freedom of action of the organisation.**

5.3.3 Relative Influence on Acceptance

This section draws together the findings in sections 5.3.1 and 5.3.2 to consider what was the critical factor underpinning acceptance or rejection in each case. The positive hypothesis advanced in section 3.2.3 would hold if there is an association between the level of agreement and acceptance of the aid. So if there is a low level of agreement then this should lead to rejection and a high level of agreement would be tied to acceptance. In this case *cognitive and social factors* can be held responsible for the outcome.

The relationship between the generic factors and acceptance has already been explored in section 5.3.1. As such, table 5:4 implies that the generic factors argument in table 3:4 fits the observed relationship in three out of four of the instances. Table 5:5 (below) expands table 5:4 and summarises the main observed linkages between the level of agreement, the specific factors and whether the aid was accepted.

The table lists the type of aid, the level of agreement with the aid, the type of problem being dealt with and the extent to which situation-specific factors (for either internal or external reasons) limited freedom of action. Finally it identifies the response to the aid in each instance.

Table 5:5 Different Decision Aiding Processes and their Acceptance

Case	Type of Decision Aid	Level of Agreement	Problem Type	Situational Constraints	Response to Decision Aid
A	IT-model	High	Adoption	No	Accept
B1	IT-model	Low	Adoption	Yes, External	Accept
B2	IT-model	Low	Adoption	No	Reject
C	Process	High	Progress	Yes, External	Accept

In terms of table 3:4 these findings imply that the **Generic Factors** are not the sole cause of acceptance as case B1 breaks the expected relationship between agreement and acceptance. No instance was uncovered of a progress decision with low agreement but acceptance, so at this stage there is no evidence for the influence of problem type on acceptance. Reasons for disagreement within the organisation in both instances of case B can be cited in terms of dislike of the need to make such decisions and of the particularly IT-based approach to decision aiding

in use. As a result, there is some support for the possibility discussed in section 3.3.1.3 that the decision aid maybe the source of disagreement but in this instance the disagreement was with more than just the decision aiding approach. Finally there is evidence for the effect of situational factors, especially in B1 where external constraints were such as to overcome the internal preferences (to reject) which in case B2 were sufficient to lead to rejection. As case B1 was an adoption decision with disagreements about the aid, since the reason for an enforced compromise was not the maintenance of an acceptable status-quo, then, as suggested in section 3.3.3 the reason for acceptance should be ascribed to the existence of external pressures.

Table 5:6 Hypotheses and Empirical Data

Factor:	Key Item of Evidence:	Finding:
Generic Factors	Will be disproved if find instances of disagreement with the decision aid but the aid is still in use.	Disproved, case B1, disagreement and acceptance
Problem Type	Will be proved if find an instance of a progress decision with an aid with which there is expressed disagreement but it is still in use;	No evidence of this
Decision Aid	Will be proved if there is evidence that the reason for disagreement is with the aid itself rather than the problem representation;	No clear evidence, may have been relevant in both cases B1 and B2
Situation Factors	Will be proved if there is evidence either that a given approach to decision aiding is being imposed or that the organisation sees itself as having little choice but to operate in a given way due to external constraints.	evidence in B1 that external constraints were important in leading to adoption, evidence in case C that external constraints were an important part of the decision making process

Table 5:6 (above) sets these findings in a contrast to the relationships set out in table 3:4 and summarises which of the assumptions can be supported by the case material described in this

chapter.

5.4 Conclusions

The cases reported in this chapter, combined with the literature review, represent the exploratory theory-building phase of the thesis. As such each raised interesting questions but none completely answers them. A major weakness was the failure directly to capture the individual cognitive representations and self-reported agreements between them. The next stage was to redesign the research methodology to allow this.

It is now possible to draw some tentative findings concerning the reasons for acceptance explored in chapter three (subject to the constraint acknowledged above). The evidence cited in table 5:6 implies that the generic factors are not the only cause of acceptance (case B1). The evidence does not confirm or reject the impact of the problem type on acceptance and is, at best, ambiguous as to the role of the decision aid in its own acceptance as in both instances in case B the parents objected to the need to make such decisions at all, and also to the approach to decision support being promoted. However, the findings are more robust in supporting the argument that situation specific factors may constrain actions and thus lead to acceptance. Again cases B1 and B2 are the central pieces of evidence as the difference between the two is the extent to which external constraints in case B1 were sufficient to overcome the internal power relationships that manifested themselves in case B2.

In summary the initial evidence is that the generic factors are not the sole cause of agreement and that the evidence is neutral for the effect of problem type or decision aid. However, it does give validity to the expectation that constraints from the specific situation maybe an important determinant of acceptance.

A strength of the cases in this chapter is the extent to which the findings forced further theory development. In particular, it was obvious from both cases B and C that the pattern of differences about a decision aid would go beyond simply being a debate between the designer and user as had been found by Cook (1992) and in case A. This led to further reflection as to the nature of the relationship between users and the decision aid and thus to the model offered in table 3:2. The main consequence of case C was to sharpen the process of trying to describe what constitutes a decision aid in an organisational context. This led to the addition of what was described in section 2.5.1 as a decision aiding process to the taxonomy of types of aids and consideration of whether approaches to organisational planning can be categorised as decision aids.

Finally, empirical shortfalls, even in case C in terms of categorising intra-organisational agreement, led to the development of the research approach set out in chapter four and the addition of Personal Construct Theory as an embedded unit within the overall qualitative, interview based, research enquiry.

CHAPTER SIX: THEORY TESTING DATA

6.1 Introduction

This chapter reports the substantive study of the thesis. It involves a college with a mix of Higher (HE) and Further (FE) Education provision and was designed to test the theory developed in chapter three using the style of research enquiry advocated in chapter four, so as to address the weaknesses in the approaches reported in chapter five. Its focus was how the college makes, and supports, its **internal resource allocation decisions**.

This chapter is structured into three sections. Section 6.2 discusses various key definitions such as describing staff in terms that fit table 3:2 and what type of problem and of decision aiding process is involved. Section 6.3 then considers if there are identifiable differences about both the nature and value of the decision aid among the staff. In turn, section 6.4 considers how this information can be combined to test the models of decision aid acceptance outlined in chapter three.

6.1.1 Context

Resource allocation was chosen as the focus of the enquiry as it is a significant issue that affects most staff in an organisation whether or not they have any direct influence over either the actual process or its outcomes. This degree of awareness offered an opportunity to identify the different degrees of staff interaction with the decision aid that fitted the categories set out in

table 3:2 (p. 70). In addition, resource allocation leaves open the type of decision support environment expected. It is feasible that support for such decisions could be based on either a formulaic model, an interpersonal planning process or a combination of the two.

Supporting material for this case study can be found in appendix two. This appendix is organised into four subsections. Section A contains the initial correspondence before starting the case-study. Section B contains the individual interview transcripts, repertory grids and questionnaires and section C reports the detail of the various statistical tests. Section D contains the correspondence with the college after the enquiry was completed.

When **referencing** to the notes in appendix two the convention has been to use a code such as 2-A-1 (appendix two, section A, page 1 of that section). For convenience when referring to individual comments, or repertory grids, that person's code (see table 6:1) precedes this as i, 2-B-1, para 1. Particular elements or constructs within an individual's grid are referred to in the text as E# or C# respectively. So a reference to the second element identified by interviewee one would be shown as i, 2-B-4, E2.

The research opportunity was derived by writing to Finance and Planning Officers in sixteen Universities and Colleges (pages 2-A-1 to 2-A-2). These had responded to previous requests (Cropper, 1995) for information about their management accounting systems and had said that they either had, or were developing, resource allocation models to inform their financial decision making. Initially, five responded positively but in only one instance did it prove

possible to negotiate access.

Once access was agreed, an initial interview and discussion with the college was held and a list of twelve staff who reflected the aim to talk to a range of people of different grades and functional roles was agreed. In outcome ten interviews were conducted and these adequately represented the various categories sought. Besides the interviews and questionnaires, some supporting documentation was also obtained such as the prospectus, a report of a recent FEFC quality assurance audit and internal papers detailing the college's managerial structure. Table 6:1 lists the ten staff who were interviewed and gives a brief description of their role in the college.

Table 6:1 Background Details of the Staff interviewed

ID:	Date Interviewed:	Description:
i	29/7/97	Head of Department in the FE part of the college. Department was responsible for health-related studies. Transcript 2-B-2 to 2-B-3.
ii	7/8/97	Head of Department in the HE part of the college. Department was responsible for Business and Information Management studies and delivered both FE and HE programmes. Transcript 2-B-5 to 2-B-6.
iii	14/8/97	Finance Officer for whole college. Transcript 2-B-9 to 2-B-10.
iv	26/8/97	Dean of a Faculty in FE part of the college offering health, art and general studies. Transcript 2-B-13 to 2-B-14.
v	28/8/97	Dean of the HE Faculty. Transcript 2-B-18 to 2-B-19.
vi	2/9/97	Lecturer responsible for a Certificate of Education in the Professional Studies, department based within the HE faculty. Programmes are funded as both HE and FE. Transcript 2-B-22.
vii	2/9/97	Lecturer responsible for programmes in Social Care within department offering health-related courses in the FE part of the college. Transcript 2-B-25.
viii	2/9/97	Head of Department in HE part of the college. Department was responsible for Management Studies and was almost entirely HE. Transcript 2-B-29 to 2-B-30.
ix	2/9/97	Lecturer responsible for management programmes delivered within the Professional Studies department. Programmes are funded both as HE and FE. Transcript 2-B-33.
x	22/7/97	Planning Officer for whole college, also in charge of central IT systems. Transcript 2-B-36 to 2-B-38.

Chapter three developed a model that suggested that different levels of interaction with the aid might be an important determinant of differences of opinion as to its validity. Since the college was split operationally between its FE and HE provision one aim was to test whether this division was also significant for their acceptance of the decision aiding process (section 6.2.1). However, the sample was selected to enable testing whether or not it was managerial role that was critical, since this fits the prior expectations of chapter three (section 6.2.2).

6.1.2 Outline of Research Design

The detailed rationale for adopting this style of enquiry was discussed in chapter four. There it was argued (section 4.2.5.3) that, due to the nature of the enquiry (theory-building), the organisational setting (section 4.2.4.1) and the basic assumption of a social constructionist viewpoint, the appropriate approach was one based around a qualitative case-study. It was noted (section 4.2.5.1) that this was at variance with the approach used in the limited number of prior studies (section 2.3.1) into decision aid acceptance, but that an important difference between this study and Timmermans and Vlek (1992; 1994), is the stress on decision aids in organisations not for personal use.

Having made a basic decision as to the nature of the research design there was then a need to consider how to gather the information needed (section 4.3). This can be seen as having four stages:

- understanding what the individuals believe;
- testing for patterns of intra-organisational agreement;

- measuring agreement or disagreement;
- identifying any other factors which might influence acceptance.

In case C, reported in chapter five, the main tool for identifying all these aspects was the analysis of unstructured interviews held with members of staff. This produced some interesting results but, in seeking to refine the methodology, it was decided to add extra dimensions to the analysis by using Personal Construct Theory (section 4.3.1.3) to represent individual beliefs. The resultant repertory grids were then compared using a methodology adapted from Daniels et al (1994) by using questionnaires. This approach generated a valuable “**embedded unit**” (Yin, 1994, p. 119) which was amenable to simple statistical testing and thus provided further evidence for the conclusions drawn from the qualitative methods of data analysis (section 4.2.2.2). The questionnaires also had the advantage of allowing the respondents to move from describing the decision aiding process to make comparisons between their views and other members of staff, and to offer a value judgement about both the process and its outcomes.

The intention of the data gathering process was to yield information that can be compared with the models developed in chapter three (table 3:4) using Yin’s (1994) methodology of pattern matching (section 4.4). In summary, the research design can be mapped onto the four goals as:

- **understanding what the individuals believe - *interview data and repertory grids*;**
- **testing for patterns of intra-organisational agreement - *interview data, contents of repertory grids and questionnaire returns*;**
- **measuring agreement or disagreement - *interview data, contents of repertory grids and questionnaire returns*;**
- **identifying any other factors which might influence acceptance -**

interview data and repertory grids.

6.1.2.1 Interviews

The interview was used to break the ice to allow the respondent to raise any points they saw as important before using Personal Construct Theory to generate a repertory grid. Therefore, other than explaining that the primary interest was resource allocation, the interview was left unstructured. The interviews were tape-recorded and notes taken at the same time. The typed notes were checked with the respondents using **respondent validation** (Bryman, 1989) and only limited use was subsequently made of the taped material.

6.1.2.2 Repertory Grids

After around 30 minutes the respondent was asked to complete a repertory grid. The structure and purpose of this was explained and most saw it as another way of representing what they had just spoken about. They were given a basic question of “**what are the main aspects of the College's information and decision aiding systems**” and allowed to generate their own elements and constructs.

At this stage the interview was ended and the respondent was promised a copy of the interview notes and grid to check. It was also confirmed that they were prepared to complete a follow-up questionnaire asking them to show the extent of their agreement with the anonymous grids of their colleagues.

6.1.2.3 Questionnaire

This final stage was conducted using the methodology developed by Daniels et al (1994) to avoid the problems of directly comparing repertory grids (section 4.3.2). Each of the ten interviewees was sent a questionnaire with all the repertory grids (anonymous) attached and asked to rate each as the "**extent to which individual grids match own response to the question**". This was answered using a simple Likert scale with 1 was set as "totally disagree", 3 as "neither agree nor disagree" and 5 as "totally agree".

This was supplemented by two questions designed to test the acceptance of both the mechanisms and outcomes of the resource allocation process as "**the extent to which you agree with the college's resource allocation processes**" (question 11) and "**the extent to which you agree with the college's resource allocation decisions**" (question 12).

The question number (in table 6:2 below) refers to the repertory grid of that particular individual as identified in table 6:1. So for respondent ii their score for their own grid (2) was 4. Despite reminders, no response was received from either (i) or (x).

Table 6:2 Questionnaire Returns

Respondent:	Page Ref.	1	2	3	4	5	6	7	8	9	10	11	12
i													
ii	2-B-8	4	4	3	4	3	3	3	4	3	4	3	3
iii	2-B12	4	4	4	3	5	3	4	3	4	5	4	4
iv	2-B-16	4	3	4	5	2	3	4	4	3	4	4	5
v	2-B-21	4	5	3	4	5	2	3	3	5	3	4	4
vi	2-B-24	1	4	3	4	2	4	2	3	3	4	3	2
vii	2-B-27	5	5	5	5	3	5	5	5	5	5	3	3
viii	2-B-32	3	4	4	4	4	3	4	5	3	4	2	2
ix	2-B-35	4	5	4	3	4	5	4	4	5	5	4	4
x													

As a simple **check on the validity** of the approach, individuals were found to rate their own maps as matching their own representation of the decision aid (2-C-1, table 1). They reported a mean self-agreement of 4.63 as opposed to 3.74 for agreement with all the other grids. This was significant using a one-tailed t-test ($t=2.72$, critical value= 1.66 , $df=7$) and matches the findings of similar studies (Daniels et al, 1994).

6.2 Assumptions and Attributions

Before reporting on the data needed to test individual representations and agreements it was first necessary to **construct the evidence base** by making assumptions about how to categorise staff, the type of decision being made and the nature of the decision aiding process. In particular, there was a need to consider how staff could be described to reflect the division between the HE and FE elements of the college (section 6.2.1), in managerial terms (section 6.2.2) and how this division could then be mapped onto the taxonomy in table 3:3 (p. 70). In

addition, before the data can be analysed to support conclusions as to the causes of decision aid acceptance, it was necessary to clarify the type of decision aid in use (section 6.2.3) and the nature of the decision being supported (section 6.2.4).

6.2.1 Split between HE and FE staff

Given the division within the college between HE and FE activities one pattern of disagreement could be across this divide. The division was not just concerning work (ie whether the individuals were engaged primarily with HE or FE programmes) but was also physical with the HE faculty occupying a separate site. The difficulty in making an allocation of staff to one category or the other lies in the extent to which FE funded courses were also delivered within the HE faculty. The other issue was how to categorise the role of those staff with cross-college responsibilities.

The attribution of staff in organisational terms to either FE or HE was primarily based on how the courses they were responsible for were funded. The assumption was that if the aiding process was preferred by one group or the other then it would reflect this criteria if the aid favoured one group or the other.

It was possible to categorise staff (as identified in table 6:1) i, iv and vii as **FE**. They are all based in the FE college and have almost no involvement with HE. Equally v and viii are basically involved with **HE** programmes to the exclusion of FE. The difficulty is that three of

the staff in the HE faculty were involved in delivering both FE and HE funded programmes (ii, vi and ix). To reflect this split role they can be categorised as being involved in both HE and FE, although in organisational and locational terms they are part of the HE faculty.

For the two senior administrative staff it was clear in the interview that iii (2-B-9, para 4 - “there are differences between HE and FE sides, in most respects HE is simpler and the main piece of data for decision making is the MaSN”) was aware of the issues and constraints facing both HE and FE and this individual is accordingly described as both HE and FE. However, x, although also responsible for issues across the whole college, took a FE-based view with little mention of HE (2-B-37, para 1 - “seeking to predict volume of funding units (FE) from the raw data ... the whole model is based around the needs of the FEFC”) and has been categorised as FE in table 6:3 (below).

A simpler variant of this three-way split can be developed based on geographic and managerial location. As the HE faculty occupies a totally different site then all of ii, vi v, viii and ix can be seen as HE staff. In this version the two senior staff are discounted as they do not easily map into the faculty structure.

6.2.2 Split between Managerial Roles

The model developed in chapter three stressed the likelihood that intra-organisational differences about the validity and nature of the aid would reflect how much interaction and

influence an individual had. This was developed to suggest a four-way division in table 3:2 of:

- **advisers** who possess a high degree of technical knowledge about the process and the simplifications needed before this can be put into operation;
- **owners** who possess a high degree of strategic control over the resultant decision but will rely on the **advisers** for technical advice;
- **users** who both lack the full technical knowledge and have a reduced degree of strategic control either because of their position in the hierarchy or because it is an issue peripheral to their primary role;
- **other** staff who may be very interested in the outcomes but due to role or grade be little more than onlookers.

The staff who were interviewed can be attributed to four broad managerial categories. Two were deans of faculty (iv and v), three were heads of academic departments (i, ii, viii), three were lecturers with responsibility for specific courses (vi, vii, ix) and finally two were senior administrative staff within the college (iii, x). The deans and the administrative staff were also members of the college's Senior Management Team.

In terms of role within the college, the two senior administrative staff provided advice to the Deans and others about the funding regime (x, 2-B-37, para 8), staff salaries (iii, 2-B-9, para 6; iv 2-B-14, para 6) and other costs (iii, 2-B-9, para 3), and interpreted this information to construct the college's formal resource allocation system (x, 2-B-37, para 1). They are, however, also involved in decisions as to the academic shape and purpose of the college as part of their role within the senior management group (iii, 2-B-10, para 1 - "in any case academic or strategic arguments may well argue that the college continues with 'loss' making activities, in this respect ... no desire to pull out of providing A Levels etc. although there is considerable local competition"). This description of their roles would suggest that they hold a hybrid

position between being **advisers and owners**. Nonetheless neither had direct control over the final resource allocations between departments as these are left to the Deans' discretion (iii, 2-B-9, para 6) and both stressed the advisory nature of their role - either as to the costs of a given department (iii, 2-B-11, E2) or how to convert FE teaching units into funding (x, 2-B-39, E8).

The position of the Deans is that of having to make final decisions as to the resource allocation between their departments (v, 2-B-18, para 7; ix, 2-B-33, para 3) together with a role within the college's overall planning system (iv, 2-B-14, para 1; v, 2-B-18, para 8). The deans often described the college's resource allocation system in similar terms to the senior administrative staff, for example in mentioning the use of a ratio of salary costs to income as a measure of efficiency (iii, 2-B-9, para 8; iv, 2-B-13, para 10; v, 2-B-19, para 4; x, 2-B-38, para 5).

In effect no major difference is apparent about involvement with the resource allocation process between either the senior administrative staff or the deans. In as far as differences in role exist, they rest with having operational responsibility for carrying out the decisions reached centrally as opposed to being primarily involved in advising what these should be. On this basis it is proposed to place the **senior administrative staff** (iii, x) in the **advisers** category and to regard the **Deans** (iv, v) as the **owners**.

It was more straightforward to characterise the role of the department heads (i, ii, viii) as **users**. This group tended to see the nature of the decision aiding process in much the same terms as the Deans, for example, identifying the imposition of additional external monitoring in the

current year (ii, 2-B-5, para 5 - “given change in FEFC rules (ie a cap on student numbers), the system has become more centralised”; iv, 2-B-13, para 7 - “changes in the FEFC rules have made hitting a precise number of units ... of greater importance”). However, they also often stressed frustration with the way the system worked, describing it as “a leech that sucks data out” (ii, 2-B-5, para 7) leading to a need for local input of data already held centrally (i, 2-B-3, para 2). In addition they tended to describe feelings of powerlessness at the operation of the planning process (eg viii, 2-B-29, para 1 - “the process is something of a blackhole”).

If the attribution of those staff described as **lecturers** to the **others** category is to be justified then they may be relatively unclear as to the technical structure of the aid, have a low level of interaction and control over the resource allocation process and tend to describe its implications as to the impact on their own particular area. In the latter respect they all identified examples of local systems that were used to provide them with the data they needed for local decision making and monitoring (vi, 2-B-22, para 5 - “seeking to develop and improve on systems within the section so as to fill the few gaps in ... formal processes”; vii, 2-B-25, para 4 - “local records are very much paper dominated with personal details, records of attendance etc.”; ix, 2-B-33, para 6 - “maintain paper records within the section for completeness and as a cross-check”). In addition, in their repertory grids, their descriptions of the elements (table 4:6, p. 119) emphasised factors such as “status of individual students” (vi, 2-B-23, E5), “section ethos” (vii, 2-B-26, E2) and “business planning within the section” (ix, 2-B-34, E3).

Overall there is sufficient difference between the comments of the lecturers and the heads of

departments to split them into a different category, but, as with the difference between the deans and senior administrative staff, there was also considerable overlap of views between the two groups. This lack of a clear subdivision between, on the one hand, deans and senior administrative staff, and on the other, heads of departments and lecturers led to the use of slightly simplified two way analysis in section 6.3.2.2 (below).

Table 6:3 Organisational Role and number of Repertory Grid Constructs

Interviewee:	Functional Role:	Organisational Role:	Grade:	Relation to Decision Aid:	Page Ref:	Number of Constructs:
i	FE	FE	HOD	User	2-B-4	3
ii	FE/HE	HE	HOD	User	2-B-7	5
iii	FE/HE	None	Admin	Adviser	2-B-11	7
iv	FE	FE	Dean	Owner	2-B-15	7
v	HE	HE	Dean	Owner	2-B-20	9
vi	FE/HE	HE	Lect	Other	2-B-23	5
vii	FE	FE	Lect	Other	2-B-26	3
viii	HE	HE	HOD	User	2-B-31	5
ix	FE/HE	HE	Lect	Other	2-B-34	3
x	FE	None	Admin	Adviser	2-B-39	6

Overall, table 6:3 (above), summarises the discussion in sections 6.2.1 and 6.2.2 to categorise staff as to whether their work is principally HE, FE or a mixture of the two, and whether they are organisationally based in the HE or FE parts of the college. Finally their grade is attributed to the taxonomy developed in table 3:2.

It is possible to use the structure of the individuals' grid to understand how detailed a given response is. If the assumption in chapter three is correct then those groups more closely aligned with the decision aid should be able to give richer, more complex, descriptions of its

structure than the others. This can be tested both for both organisational and staff grade structures of the college and Reger (1990b) suggests that counting the number of constructs identified by each individual forms a proxy for how well they understand the issue (section 4.3.1.4, pps. 116-117).

For the organisational dimension it was decided to test this at its simplest level of which area of the college the member of staff worked in (ie HE or FE), and, thus, to exclude the senior administrative staff (as discussed in section 6.2.1). The results of both T-tests (testing by functional role) are shown in table 2 (2-C-1) and support the qualitative conclusion already derived that there is no real difference in the representation or the perceived value of the decision aiding process between the HE and FE parts of the college ($t=0.0$, critical value=2.02, $df=5$).

However, a t-test analysis was also conducted to see if there was any significant difference between the two groups of senior administrators and deans as opposed to heads of department and lecturers (table 2, 2-C-1). This analysis found a significant difference between these groups ($t=3.42$, critical value=1.94, degrees of freedom=6).

6.2.3 Nature of the Decision Aid

Before it is possible to move onto an analysis of the findings about decision aid acceptance, it is necessary, to support the testing of table 3:4, to categorise the decision aid itself using the

taxonomy developed in section 2.5.1 (p. 51) of:

- “an **IT-based Decision Support System**, with a formal system to regularise choice and to represent the problem structure;
- a planning approach which makes use of **IT-based models**. These may draw material from other datasets in the organisation to allow what-if analyses to be performed. Although the system will use IT, it is subsidiary to the subsequent interpersonal decision process;
- a planning approach which is based on a basically interpersonal **decision aiding process** which sees little use of IT, and mainly consists of an organisational planning routine designed to explore the nature of a problem and identify potential solutions”.

This section starts with a description of the approach to decision aiding in use within the college (section 6.2.3.1). Section 6.2.3.2 then considers whether this is actually a decision aid in the terms of table 2:5 (p. 56) and, if so, how it fits within the taxonomy repeated above.

6.2.3.1 Outline of Decision Aid Structure

From comments in the interviews, and elements derived for the repertory grids, describing the decision aid in use is possible. As noted in the introduction to this chapter, the aim was to use resource allocation decision making as the focus for this enquiry and the basic question posed asked for a description of how this was supported. From the information provided by the interviewees (section 6.2.2) it is possible to argue that there is a relatively shared view about what constitutes the support system for these decisions. The system consists of a **data store** holding the basic information and **target setting and monitoring processes**.

The principal **data store** is a student record system (called CovTec) purchased in the mid-1990s (x, 2-B-36, para 1). This is designed to hold information on all students from enrolment to completion or withdrawal and its primary purpose is to inform funding returns to the Further Education Funding Council (FEFC). Information is input using class-registers completed for all modules (whether HE or FE funded) and the registers are submitted weekly by individual lecturers (eg vii, 2-B-25, para 6). The process of completing these registers is seen as a significant burden by staff across the college (i, 2-B-3, para 4 - “frustration”; vi, 2-B-22, para 3 - “rejection notes”; viii, 2-B-30, para 2 - “time consuming”; x, 2-B-36, para 6 - “frustration”). The other difficulty identified by many staff is that, because the system is oriented to the needs of the FEFC, it is of only limited value as an internal source of information (i, 2-B-3, para 2; iv, 2-B-13, para 2). To counteract this, various sections have developed local systems (ii, 2-B-5, para 1; iii, 2-B-9, para 2; vi, 2-B-22, para 5; viii, 2-B-30, para 1; ix, 2-B-33, para 6; x, 2-B-36, para 2).

To support **target setting and monitoring** of student enrolments and early withdrawals, CovTec was supplemented by a series of spreadsheets (iii, 2-B-9, para 3; x, 2-B-37, para 1), that converted raw data about student enrolments into FEFC funding terms. The actual process of estimating future student numbers was commonly described as being based on past experience (eg ii, 2-B-5, para 4) but this was tempered by setting each faculty an overall target based on the college’s need to ensure it obtained maximum funding from the FEFC (iv, 2-B-14, para 5). Despite this central control, many staff reported the target-setting process as driven by their estimates of what they could deliver (eg ix, 2-B-33, para 1). The bridging explanation for

this is provided by iv (2-B-14, para 2 - “need to ensure that targets of sections add up to those set for the college, no real mismatch this year so no need to look for new business etc.”) who noted that although the original targets were set by the departments these were then crosschecked to see that they gave the desired overall totals.

The planning process was not just about estimating future student numbers and thus income. It also involved discussions about staffing needs (i, 2-B-3, para 3 - “allocation of extra members of staff”), equipment requirements (viii, 2-B-29, para 7 - “concerns for the IT equipment base”) and decisions about which courses to expand or even close (ii, 2-B-5, para 5 - “remove uneconomic courses from the portfolio”).

Although there was an element of using an **IT-model** to inform decisions, most staff stressed the interpersonal nature of both how information was gathered (eg ii, 2-B-5, para 2) and the importance of meetings in determining the plans. The latter was often identified when completing the repertory grids (i, 2-B-4, E5 - “individual, informal meetings”, ii, 2-B-7, E5; iv, 2-B-15, E2; v, 2-B-20, E2 - “management meetings”; viii, 2-B-31, E2; ix, 2-B-34, E5). Thus v (2-B-20) linked “management meetings” (E2) with a construct of “relevance to policy formulation” (C1).

The final element to the planning process was a series of reviews held in October (ii, 2-B-5, para 6) and February (iv, 2-B-13, para 5) to check that actual recruitment and retention rates matched the estimates and thus to ensure that funding from the FEFC could be safeguarded.

6.2.3.2 Nature of the Decision Aid

Table 2:5 suggested a five-stage test as a means to identify if what is being observed is in fact a decision aid. From the information identified in section 6.2.3.1 it can be argued that the process found in this college does satisfy these requirements, as:

Table 6:4 Is this a Decision Aid?

Criteria:	Evidence:
A definable organisation planning process;	target setting and reviews - i, 2-B-2, para 4; ii, 2-B-5, para 6; iii, 2-B-9, para 5; v, 2-B-20, E1; vi, 2-B-23, E4; viii, 2-B-29, para 1; ix, 2-B-33, para 1; x, 2-B-38, para 1.
A recognisable problem and desired outcome;	allocation of resources within the college - iii, 2-B-9, para 8; iv, 2-B-13, para 9; v, 2-B-19, para 4; viii, 2-B-29, para 5; x, 2-B-38, para 5.
Systems for gathering information;	student record system - i, 2-B-4, E2; ii, 2-B-5, para 1; iii, 2-B-9, para 2; iv, 2-B-15, E1; vi, 2-B-22, para 1; vii, 2-B-26, E5; viii, 2-B-31, E4; ix, 2-B-33, para 4; x, 2-B-36, para 1.
Systems for analysing information;	IT and Formal meetings - i, 2-B-4, E3; ii, 2-B-7, E5; iii, 2-B-9, para 7; iv, 2-B-15, E2; v, 2-B-20, E1; vii, 2-B-26, E1; viii, 2-B-31, E2; ix, 2-B-34, E5; x, 2-B-37, para 1.
Maybe some use of IT.	through CovTec and spreadsheet planning system

On this basis, the process in the college is a decision aid as defined in table 2:5. The other important conclusion that can be drawn from table 6:4, is one of a **shared description within the college as to the nature and key elements of the decision aid** and about how resource allocation decisions are reached.

Having identified the process as a decision aid it is then necessary to seek to fit it to one of the three categories offered in section 2.5.1. From the description above it is clear that the process

cannot be described as a decision support system as although there is an IT-element in the data store and as a part of the planning approach, most of the process is interpersonal and conducted in both formal and informal meetings. These are used to test options (iii, 2-B-10, para 1 - “ways in which income can be increased or expenditure decreased or work practices reviewed”) and to monitor progress towards agreed goals (iv, 2-B-13, para 5). On this basis the system equally cannot be described as an IT-based model and instead the nature of the organisational planning approach means the best attribution is as a **decision aiding process**. This is important as section 3.3.1.2 noted that such an approach to decision aiding was unlikely to be rejected due to unfamiliarity, although this could still occur due to reasons of disagreement with the underlying problem representation.

6.2.4 Nature of the Decision Situation

The final piece of information needed to test the models set out in chapter three is to identify the type of decision being undertaken. Beach (1990) proposed a split between new decision situations and those where choices had to be made within the framework of an already agreed solution (section 2.4.1.3). In the latter case, the consequence was the likelihood that disagreements would be downplayed if maintaining an already adopted solution was possible.

At the time of the research the college was due to receive the same overall grant from both the Further and Higher Education Funding Councils as it had in previous years (iii, 2-B-9, para 5). The consequence was described (iv, 2-B-13, para 9) as an opportunity to repeat the previous

year's budgets and this overall stability would support the attribution of the decision situation to the category described in section 2.4.1.3 (p. 37) as a **Progress Decision**.

Within the overall decision process two specific criteria stand out. One is the basic decision rule determining what level of resources will be made available to a given department and the other is the importance of external influences on the college.

When determining the allocations to departments, the first concern was to cover the cost of any full time salaries (iii, 2-B-9, para 6; v, 2-B-18, para 7; ix, 2-B-33, para iii). This led to what was described as the **main internal decision rule** for resource allocation (iii, 2-B-9, para 8; iv, 2-B-13, para 10; v, 2-B-19, para 4; viii, 2-B-29, para 5), that sections should spend no more than 60% of their notional income on payroll and non-payroll costs (the remaining 40% being used to cover central costs). The consequence of the prior allocation of income to cover fixed salary costs was a perception that there was very little subsequent flexibility in how the remaining funding was allocated (eg ix, 2-B-33, para 3 - "salaries are a major fixed element then there is little leeway for practical allocation decisions").

Doubts were expressed about whether there was any real intent to deal with those departments spending above 60% of their notional income locally (v, 2-B-19, para 4), by forcing them either to reduce their costs or increase their income, although central administrative staff did claim this was "closely scrutinised" (x, 2-B-38, para 5) and an "active goal" (iii, 2-B-10, para 1). The basic rule was also tempered in that "deans can operate cross-subsidies but the long term aim is

for all units to move to equilibrium" (iii, 2-B-9, para 8).

External stakeholders were an important part of the internal decision processes, and, as in chapter five, they operated as a clearly understood constraint on internal freedom of action. Staff clearly identified the internal decision process as being dictated by external constraints. Commonly the whole decision aiding system was described as necessary because of the demands of the FEFC (iii, 2-B-9, para 2; iv, 2-B-13, para 1; v, 2-B-18, para 4; vi, 2-B-22, para 1; viii, 2-B-29, para 2; ix, 2-B-33, para 4; x, 2-B-36, para 6), and equally staff were aware of how limited their internal freedom of action was precisely due to the weight of external issues.

An example of the effect of external pressures is the revision to the actual budget and planning system due to a change in the external funding regime operated by the FEFC. In previous years, as applied to case C in chapter five, the FEFC provided full funding for a certain number of students and then funded additional places at a marginal rate. This year the system changed to one where the college bid for a fixed number of funded places and would receive no additional allocation for over-recruitment (iii, 2-B-10, para 2). This led to a central decision to seek to recruit a fixed number of students and the emphasis of the planning process changed to ensuring that the targets allocated to individual departments were capped to prevent over-recruitment (i, 2-B-2, para 7; ii, 2-B-5, para 5; iv, 2-B-13, para 7). This change was seen by many staff as leading to an increase in the extent of central monitoring of plans, recruitment and retention. No staff attributed this change to a choice freely made by the college's management team (iv, 2-B-14, para 2; vi, 2-B-22, para 1 - "emphasis has changed since incorporation with

the FEFC ... the result is one where this sort of checking and tracking is much more relevant”; ix, 2-B-33, para 4; x, 2-B-37, para 3).

One potential consequence of this change in the funding regime was the possibility that the full allocation bid for would not be made, leading to a need to make decisions about retrenchment (iv, 2-B-13, para 9 - “fear that the FEFC would cut the number of units by some 40,000 - this led to contingency planning as to how to absorb the cut”; v, 2-B-18, para 8 - “concerns as to whether the FEFC would make available the sum entered into the budget process”). The feeling was that if such cutbacks did occur then the whole basis of the current resource allocation split could come into question (iv, 2-B-13, para 9; viii, 2-B-29, para 6).

A specific example, cited in this respect, was the issue of who paid for the purely HE section within the college’s student registry. At the moment the cost of this was borne by the entire college but iv (2-B-13, para 9) specifically identified this as an issue he would challenge before accepting cuts in his FE-based faculty. By contrast, viii (2-B-29, para 6) voiced a belief that funding for the HE programmes was being reallocated to support FE and that this would need to be resolved before he would accept the validity of any retrenchment in his department.

6.2.5 Summary of the Attributions

To summarise, section 6.2 has taken the basic data derived from the interviews and the repertory grids and suggested how it could be described in the terms needed to test the models

developed in chapter three:

- individual staff were attributed to the FE/HE split within the college on the basis of both the type of programmes they were involved with and their physical location within the college;
- individual staff were attributed to the taxonomy of influence on the decision aiding process. As a result administrative staff were described as advisers, deans as owners, departmental heads as users and other staff as others;
- the decision aid in use was identified as an example of a decision aiding process;
- the decision making situation was identified as an example of a progress decision.

These attributions are used in section 6.3 to explore various patterns of agreement and disagreement with the decision aid and to consider which of the two models in chapter three can actually be supported (section 6.4 below).

6.3 Extent of Intra-Organisational Agreement with the Decision Aid

Section 6.2 has concentrated on describing the critical relationships between staff in the college, the nature of the decision aiding approach in use and the type of decision being made. The intention in this section is to consider whether, and why, there is overall agreement across the college with the aid. Due to the two ways categorising staff is possible (table 6:3), this is done both on organisational (functional) grounds (section 6.4.1) and in terms of managerial position (section 6.4.2). These two sections are subdivided into reporting the findings from the qualitative element of the enquiry (the interviews and the repertory grids) and the more quantitative data that can be extracted from the questionnaire returns (table 6:2).

Before starting the detail of this section it is worth restating the extent to which table 6:5 (below) repeats table 6:4 by revealing general agreement across the college as to the nature of the decision aiding process and the constraints on decision making within the college. This leads to an emphasis being placed on the perceived value of the decision aiding process to see if it is in this respect that a pattern of agreement and disagreement can be discerned.

Table 6:5 Agreement with the Structure of the Decision Aiding Process

Aspect of Decision Aiding Process:	Identified by:		
	Purely FE Staff	Staff with a mixed role	Purely HE Staff
	(i, iv, vii, x)	(ii, iii, vi, ix)	(v, viii)
Student Record System	i, iv, vii, x	ii, iii, vi, ix	v, viii
Spreadsheet planning system	i, x	ii	viii
Class Registers to gather information	i, iv, vii, x	iii, vi, ix	viii
Target Setting process	i, iv, x	ii,, iii, ix	v, viii
Review and Monitor process	i, iv, vii, x	iii, vi	v, viii
Use of formal meetings	i, iv, vii	ii, vi, ix	v, viii
Budget Allocation Rule (spend under 60%)	iv, x	iii,	v, viii

6.3.1 In Terms of Organisational Role

In this section the intention is to explore any differences in the perception of the value of the aid linked to the organisational split of the college between HE and FE programmes.

6.3.1.1 Data from Interviews and Grids

To restate the interviews and the elements identified in the repertory grids all support a conclusion that the nature of the decision aid is shared regardless of staff role. Accepting this

description of general agreement with the nature of the aid is there any discernable difference in how its value is described? The first conclusion to be drawn here is that few staff in any part of the college were particularly supportive of how the system worked. For example, as previously discussed in section 6.2.3.1, the process of completing the class registers was described as frustrating, time consuming and without any discernable benefit (eg i, 2-B3, para 4; vi, 2-B-22, para 3; vii, 2-B-25, para 6; viii, 2-B-30, para 3). Other areas where the system was seen to be flawed was in the repetition of data demanded (i, 2-B-3, para 2; ii, 2-B-5, para 7; iv, 2-B-13, para 2, viii, 2-B-30, para 5) and the inaccuracy of the central record (iii, 2-B-9, para 2 - “manual crosschecking with departments”; iv, 2-B-13, para 4 - “rarely accurate”, vi, 2-B-22, para 9 - “awful lot of crosschecking”).

Many staff preferred data generated informally through meetings with their colleagues to that available via the central record system. One interviewee (iv), the dean of one of the FE Faculties, developed a construct that directly measured the elements of his repertory grid in terms of importance (2-B-15, C6 - “key event with major implications”). In positive terms he described the planning process and data on student recruitment and retention while in negative terms he identified the student record system (CovTec) and the class registers. This construct is closely related to one that describes whether the data source is his own staff (C3 - “data comes from section heads”), implying an attribution of value to information internal to the faculty rather than centrally generated. A head of department in the HE faculty, supports this attribution of poor quality data to the central processes (2-B-30, paras 2-4). So organisational role may not be a cause of differences of opinion as, in effect, few staff were actually

supportive of the process.

However, there is one identifiable difference in terms of how either FE or HE staff identified with the system. Despite their misgivings, in the main FE staff accepted the process as it was based on the requirements of the FEFC (iv, 2-B-14, para 1; ix, 2-B-33, para 4; x, 2-B-38, para 3). HE staff tended not only to point to the FE-HE split in the college more frequently (v, 2-B-18, para 3; viii, 2-B-30, para 2) but to see the whole college system as something imposed on them, leading to a “collision of cultures” (v, 2-B-19, para 6). Also in the structure of his repertory grid, viii uses phrases such as “monitoring” (C1, 2-B-31) and “control” (C4). In the monitoring category was the whole planning, budget and performance review system. Even so, it is important not to read too much into this, as a lecturer in the FE faculty (vii) developed a construct (C3) of “something that I can personally influence” and placed the entire FEFC funding system in a category of having no influence over at all.

6.3.1.2 Data from Questionnaires

The questionnaires were designed to supplement the interviews by testing whether individuals agreed about the representations of the aids in their repertory grids. As a result they can be used to uncover variations in agreement based on whether staff work in the HE or FE parts of the college (ie this excludes the two administrative staff and follows the organisational attribution developed in table 6:3).

First, the implication from the qualitative studies of a low level of perception of the value of the process can be supported by the average (for all staff) level of agreement with both the validity of the aid (question 11) and the outcomes of the process (question 12). These were both 3.38 (on a scale of 1-5 with 5 as totally agree). A simple T-test (table 3, 2-C-2) was used to check if there is any significant difference in agreement between HE and FE staff ($t=0.44$, critical value=2.57, $df=5$). From this it is clear that there is no significant difference in either the value of the decision aid or how acceptable its outcome is, in terms of organisational role.

The questionnaire data can also be used to test whether HE staff are more likely to agree amongst themselves than with FE staff and vice-versa (table 4, 2-C-2). This shows no significant differences in terms of agreement within or between the two groups thus reinforcing the basic conclusion that organisational role is not currently the reason for any major differences within the college ($t=1.09$, critical value=2.57, $df=5$).

The decision to categorise staff in terms of organisational role was a product of the situation revealed during the interviews. Having discerned that there was such a potentially important divide within the college it was necessary to explore this to understand whether it, in itself, was a trigger for differing views about the validity or structure of the decision aiding process. The outcome of this investigation implies that, at the time of the enquiries, there was no significant difference within the college concerning organisational role.

6.3.2 In Terms of Grade

This section considers if there is any identifiable difference in terms of organisational grade as to the perception of the structure or value of the aid. This particular set of differences lies closer to the assumptions in the model hypothesised in chapter three. The description of the staff interviewed in table 6:1 can be mapped, as in table 6:3, to four grades (senior administrative staff, deans, heads of departments and lecturers) and these grades are in turn linked to the taxonomy in table 3:2 of advisers, owners, users and others respectively.

6.3.2.1 Data from Interviews and Grids

Section 6.2.2 has already discussed the extent to which it is possible to attribute staff to distinct groupings along the lines hypothesised in table 3.2. This section concentrates on whether there are identifiable differences between these groups and, in particular, between the senior administrative staff and deans on one hand and heads of departments and lecturers on the other. This needs to be explored as it provides evidence to confirm or reject the initial assumption that involvement with, and control over, the decision aiding process will lead to agreement with it. This implies two stages:

- Are there differences between the major managerial groupings in the college?
- Are these related to a varying level of agreement?

Some of the differences and similarities in the nature of the information presented by the

interviewees, as to grade, have already been considered in section 6.2.2. To summarise from that discussion:

- **senior administrative staff (advisers)** have an essentially advisory role although this is tempered by their joint membership of the senior management group together with the deans;
- the **deans (owners)** have a similar perception as to the nature and purpose of the decision aiding process but tend to see their role as running the planning system and monitoring subsequent outcomes;
- the **heads of departments (users)** share with the deans a similar description of both the nature and the problems of the planning process. However, it was also possible to identify a greater degree of frustration with the operation of the system sometimes expressed as feelings of powerlessness;
- finally the **lecturers (others)** varied in both their description of the nature of the system especially in describing it in terms of their own particular area and in local solutions they had implemented so that they had the information needed to carry out local planning and decision making.

It is possible to elaborate on these broad conclusions using the repertory grids. The **senior administrative staff (advisers)** are iii (2-B-11) and x (2-B-39) and in their grids they identify:

- (iii) makes distinctions between internal and external factors (C1), differences between monitoring present activities and planning (C2, C3 and C5) and the extent to which a given measure relates to the academic side of the college (C6 and C7). These distinctions are exemplified by seeing the various funding councils and their rules as major external influences (E3 and E6). Issues which are held to set current internal goals are also external (E1, the FEFC) while those issues that set future goals are often internal, such as the need to generate funding for future capital investment (E4). Although the finance officer stressed a distinction between academic and non-academic concerns he explains this by describing the FEFC and HEFCE funding models (E1, E6), room usage rates (E5) and the class registers (E8) as examples of academic concern;
- (x) makes similar distinctions between internal and external influences (C2) and between measuring current activities as opposed to planning for the future (C4 and C6). However, his grid varies somewhat in drawing attention more clearly to the HE/FE split (C1), whether a given source of data is widely accepted (C5) and

the extent to which a given element is IT based (C3). As with (iii) the external influences are described as the two funding councils (E7 and E8) whilst the planning process (E6) is seen as a mix of internal and external and the review process (E5) is described as totally internal. Similar issues are seen as examples of current performance (registers-E3, covtec-E2) and as means of planning for the future (planning process-E6). However, unlike (iii) he sees the external funding constraints (E7, E8) as not just influencing current activities but as a significant element in the college's longer term planning process. His description (C5) of the elements which are widely accepted is not very discriminating and in as far as any areas are seen as being of limited validity it is the arrangements for the HE registry (E2) and the external funding regime (E7, E8).

In summary both these staff identify the importance of external constraints on the college and divide the decision aiding process between monitoring and planning. There is some difference in that (iii) describes the external influences as influencing present behaviour and seems to imply that the college is taking a more internally-driven view of its future plans. (x) by contrast, identifies the external elements as a significant driver not just of current behaviour but also of the longer term planning horizon.

The two deans (iv, 2-B-16) and (v, 2-B-20) describe the decision aiding process in their repertory grids as:

- (iv) repeats the distinction drawn by both (iii) and (x) between elements of the system used for monitoring the current position rather than planning (C1, C5). In terms of monitoring are the various performance reviews (E2, E3), the class registers (E8) and recruitment and retention data (E5, E6) although the latter, together with the income-expenditure ratio (E4) are also described as setting future targets. (iv) also developed two fairly closely linked constructs of importance (C6) and whether or not it measures the quality of the actual performance (C7). Issues which are seen to be both important and related to quality include the performance reviews (E3) and retention rates (E5) whilst both the class registers (E8) and CovTec (E1) are described as being of low importance and as not measuring institutional quality. Other constructs that are

- closely related to “importance” (C6) include data gathered from departmental heads (C3) and whether the information is used in decision making (C2);
- (v) again repeats the distinction between monitoring and planning (C1, C4, C8, C9) and reintroduce the distinction as to the nature of the external influences on the college (C3, C5). The funding system (E3, E4, E5) and the resultant planning process (E6) and CovTec (E7) are all seen as issues over which the college has no choice. He repeats the construct offered by (iv) between information that directly informs decision making such as the external funding system (E3, E4, E5) and, unlike (iv), attributes CovTec (E7) to this role rather than departmental heads (E8) or the basic planning meetings (E1). Again, as with (iv), he describes meetings with departmental heads (E1, E2, E8) as central to generate plans for the future and adds to this the overall aspirations developed within the senior management group (E9). In addition, he too sees CovTec (E7) as essentially irrelevant to this process.

Overall, (iv) describes a system with some of the distinctions of the senior administrative staff but also one that varies in important ways. In particular, he rejects the assertion of x (2-C-39, C5 - “is this source of information widely accepted”) that almost all the system is widely accepted by describing both CovTec and the class registers as yielding data which is of little significance. Interviewee (v) shares much of this description although he reintroduces the importance of external influences. Given his role as dean of the HE faculty, he was very aware of the demands of the validating University, in this instance as a cap on the size of his faculty (2-B-19, para 3, manuscript addition - “unless relationship with ... can be ‘tweaked’”).

Among the four staff who hold senior positions in the college (iii, iv, v and x) there is considerable similarity in the description of the decision aiding process with identification of a split between monitoring and planning segments and, in the main, a shared description of what forms these two parts. Similarly all but (iv) describe external constraints and all see these as reflecting the external funding system on the internal processes.

Where they differ is about the value attributed to the various elements. (iii) did not produce a construct that evaluated the effectiveness of the aiding process, while (x) described the entire system, from informal meetings to CovTec, as of essentially even value. Both deans disagreed with this and describe the college's formal Management Information System (CovTec) as being of limited value in terms of planning and actual decision making.

Turning now to the heads of departments, or **users**, (i, 2-B-4; ii, 2-B-7 and viii, 2-B-31), identified:

- (i) overall this is a simple grid with very little discrimination between the constructs which are all highly related, the constructs included whether or not the information was IT-based (C1), highly structured (C3) or elicited from individuals (C2). Examples of elements that were IT, structured and non-personal included the financial record (E1), CovTec (E2) and the faculty planning spreadsheets (E6) and these were contrasted with information from individual lecturers (E3) and, to a lesser extent, from staff meetings (E4, E5);
- (ii) also produced a grid that is highly correlated in its internal structure. However, the constructs echo issues identified by the senior staff between qualitative and quantitative data (C1), planning against monitoring (C4), a distinction between internal and external focus (C5) and whether it is dealing with "core academic concerns" (C2). There is a particularly close ranking of elements as to whether they generate qualitative data (meetings of various types as opposed to MIS and IT systems) and their focus on academic concerns. To a lesser extent this is also mirrored in whether the element is seen as having a current monitoring role or if deals with the future. In part this is also reflected concerning those items seen to have an external or internal focus. Thus CovTec (E1) is described as quantitative, without any academic focus and concerned with internal data management whilst by contrast departmental meetings (E4) deal with qualitative information, have a strong academic focus, are a central part of the planning system and are concerned with external customers;
- (viii) also made distinctions between monitoring (C1) or planning (C4) and a value judgement of how applicable a given element was to the work of the department (C5). He also developed a construct as whether there "is shared understanding" within the college (C3) against which no element scored above "3" (where 1 is none). Monitoring systems included the planning process (E1),

CovTec (E4), budget setting (E5) and performance reviews (E7). The main planning and resource allocation system was the planning process (E1) which with CovTec was seen as of the highest relevance to the work of the department.

This group of interviewees tend to stress the importance of the planning process and that this is fundamentally qualitative. Formal IT elements are described as quantitative monitoring data and, in turn, related to a perceived lack of value and relevance to academic issues. Overall, the repertory grids of this group do not ascribe value to any processes outside their immediate influence such as departmental discussions. In effect they make a different (and lower) attribution of value to the overall decision process than that of the two deans.

The three lecturers, **others**, are vi (2-B-23), vii (2-B-26) and ix (2-B-34), and identified:

- (vi) used constructs that distinguished between pastoral and management information data (C2), and whether or not it was focussed on the individual student (C1, C3 and C4). These three constructs are closely related and, for example, the annual review system (E4) is seen as not having any focus on the individual student in contrast to the information derived from student enrolment forms (E1). All elements of the college's information system are seen as needed for "funding purposes" (C5);
- (vii) described constructs about what factors influenced internal decision making (C1), whether they were used by others to monitor progress rather than by the other lecturers on the course (C2) and whether or not it is something over which the individual has control (C3). Apart from the implications of the college's community role (E6) everything is seen as both influencing decision making and used by others for monitoring. This includes the college's overall goals (E1), the funding rules (E3), requirements of validating bodies (E4) and CovTec (E5). Of this set the individual felt some control over the college's goals and more particularly over those of their department (E2) but not at all over the funding system or professional constraints from validating bodies;
- (ix) split the elements between whether they were "part of the external environment" (C1), whether the information was numerical (C2) and whether it was something solely done for information gathering (C3). The external environment was dominated both by the funding rules (E1) and the college's

planning system (E3). Numerical information was derived from the funding rules and CovTec (E2) in contrast to discussions within the department (E5) which was also not seen as conducted primarily for information gathering.

Again there is sufficient evidence to support the conclusion that the basic structure of the decision aiding process is seen in a similar way in the other groups. However, to a greater extent than the heads of departments, there is an emergence of a set of constructs implying lack of personal control. The other feature lecturers identified was the need for information on individual students to support their own work (eg vi, 2-B-22, para 6 - "information ... held locally is ... partly a desire to hold some information that is specific to the section's needs").

Overall the evidence from the interviews and the individual repertory grids suggests that there is agreement within the college as to the structure of the decision aiding process. In particular, the major salient features (table 6:5 above) are identified consistently and so is the way in which important criteria are described. These include:

- whether the information is qualitative or quantitative;
- whether the information is used for planning for the future or monitoring the current situation;
- whether the focus is essentially internal or external.

What is less agreed is a judgement as to the value of the decision aiding process. (x) implies that all the constituent parts of the decision aiding process are accepted but this is disputed by (iv) and (viii) though few staff voluntarily produced a construct which was directly evaluative. Other differences, including the extent to which the focus of the process is the individual student, becomes more marked among the lecturers than the senior staff and departmental

heads attribute the greatest value to sub-faculty processes rather than central college systems.

6.3.2.2 Data from Questionnaires

The questionnaire data can be used to develop the qualitative data in two respects. One is that it allows an alternative method of testing whether or not there is broad agreement with the nature of the decision aiding process in the college. Each individual was asked to rate *“the extent to which individual grids match own response to the question”*. The question in this case being that posed when the individual was asked to complete their repertory grid: *“what are the main aspects of the college’s information and decision aiding systems”*. The other value to the questionnaire was the way in which question 11 (*“to what extent do you agree with the College’s Resource Allocation Process”*) and question 12 (*“to what extent do you agree with the college’s resource allocation decisions”*) enabled the respondents to make formal evaluative judgements.

This section repeats two tests used in section 6.3.1.2, for patterns of agreement as to the nature of the aid and as to its value, but now about managerial grade. For simplicity, and because it fits the analysis in section 6.3.2.1, staff have initially been grouped into two broad groups of senior staff (iii, iv, v and x) and the rest. This reflects the split between the members of the senior management team and other staff in the organisation. Since the initial conclusion from section 6.3.2.1 is one of overall agreement about the structure of the aid, this simplification was justified as the intent was to see if, even at an aggregate level, a pattern of agreement, and

disagreement, with its perceived validity, can be found.

The first part of table 5 (2-C-3) reports whether there is any difference between agreement about the aid's structure in group as opposed to between the groups. The in-groups were respectively senior staff with senior staff and other staff with other staff. This confirmed the qualitative conclusions reported in section 6.3.2.1 by finding no significant differences ($t=0.82$, critical value=1.66, $df=78$) at this level. This result was supported by looking at a subset, with the in-group set as senior staff and the second group being all other staff in the college. Again no significant differences were found ($t=0.21$, critical value=1.70, $df=30$) concerning how the aid was represented. Overall this reinforces the view reported consistently in this chapter that the nature of the decision aiding process is widely shared among all staff.

As noted, though, this analysis does not consider the value of the aid. From the interviews there is little doubt that most staff have some misgivings about the process and substantial reservations about the value of the quantitative data in use (section 6.3.1). However, the data in table 6 (2-C-3) suggests that the senior staff are more likely to attribute a higher value to the decision aiding process ($t=2.37$, critical value=1.94, $df=6$) and the outcomes ($t=2.76$, critical value=1.94, $df=6$) than the others. Both the qualitative and the quantitative analyses have emphasised a shared representation of the nature of the aid without systematic differences in terms of organisational role. This implies that the differences in the perceived value of the process, in terms of grade, does fit the relationship originally developed in chapter three. The implications of this evidence are now considered by comparing the findings reported to the

model in chapter three using Yin's (1994) Pattern Matching.

6.4 Can the Basic or Alternative Models of Decision Aid Acceptance be Supported?

In chapter three, the core difference between these two explanations for decision aid acceptance was expressed in terms of the relationship between agreement and acceptance. Basically if the situation revealed both agreement and acceptance (or disagreement and acceptance) then the **basic model**, which argued that the cause of the acceptance of aids could be traced to the level of intra-organisational agreement, could then be sustained. This section considers whether the findings from section 6.3 support such a conclusion or if there is a need to look for additional influences on acceptance?

6.4.1 Pattern of Agreement with Decision Aid in the Organisation

As has already been explored and discussed in section 6.3.1 overall there is no disagreement with the decision aiding process within the college in terms of organisational role. This can be interpreted as shared dislike of the approach. Few staff, whether working in HE or FE, found any difficulty in criticising the system for the work it imposes, data inaccuracies or the extent to which it was necessary to repeat basic data input for each task. There are differences in attitude between staff, especially over decisions such as the funding of the HE registry and the extent to which the college is operating cross-subsidies but these are latent if each individual area can sustain its current allocation. (iv) for example, stressed how, if there had been a need

for budget reductions he would have raised several factors that, all things being equal, he was content to let be (2-B-13, para 5 - “contingency planning as to how to absorb the cut” and para 6 - “some feel for the relative efficiency between the three colleges but with a few unresolved items - such as who pays for the HE registry”).

When the data is analysed in terms of managerial grade a slightly different picture emerges. Again the finding that there is general agreement as to the nature of the aid is sustained through analysis of the interview transcripts, structure of the repertory grids and the questionnaire returns. So if there is any difference of opinion within the college it is not really about the nature of the aid.

The questionnaire allowed individuals to evaluate (section 6.3.2.2) the value both of the aid and of the resultant decisions. In this sense there are real and identifiable differences within the college as to its value in a way that matches the expectations of the model developed in chapter three. However, the aid is still in use so these differences are not enough to prevent acceptance in the sense of usage.

In this instance it maybe that there is a relatively simple explanation for this. Disagreement has not led to rejection and this indicates that the generic factors are not a suitable explanation for the acceptance of the aid. As a result considering what specific factors may be at work to affect acceptance is necessary.

6.4.2 What Specific Factors Influence Acceptance?

From the information so far reported, it is not possible to support the simpler model advanced in chapter three that there could be a relationship between intra-organisational agreement and usage or rejection. When the organisation is examined in managerial terms there are identifiable differences as to the value of the decision aid. Nonetheless, at the time of the research, it was still in use both as a decision support process and to inform the actual budget allocations made within the college. From this it is then possible to consider which of the three alternative factors identified in chapter three are influencing acceptance here. To repeat, from section 3.3.1 (p. 73) these are **problem type**, **nature of the aiding process** and **issues specific to the decision situation** being studied.

6.4.2.1 Problem Type

As has been discussed in section 6.2.4, at the time of the interview the college was facing a situation where, despite changes to the external situation, it could continue to make similar internal resource allocations as it had in previous years. Thus using the problem-situations identified in sections 2.4.1.3 and 3.3.1 this was characterised as a **progress decision**.

If the basic model, developed in section 3.2.3, held then the disagreement should have led to rejection of the decision aid. However, it was **still in use** and this fits the expectations in section 3.3.2, in particular that a continuation of the status-quo would be accepted as much for

reasons of inertia as for its intrinsic value. This was confirmed, particularly in interview (iv) where the Dean pointed to several contentious issues in the current allocations but showed a willingness to accept them if his particular faculty's allocation was left untouched.

6.4.2.2 Type of Decision Aiding Process

As has been identified in section 6.2.3, in this instance the decision aid consists of the type of planning **process** identified in section 2.5.1. The core distinction about the role of the three types of decision aids (as defined in section 2.5.1) and their influence on acceptance (developed in section 3.3.1.2) was that a process aid would be the most neutral of the types. The assumption was that this would result from the lack of clear distinction between it and the overall decision process. Here people agree about the nature but not the value of the aid. Equally they are only pragmatically supportive of the resultant decisions so the original assumption that the aid (when constructed in this way) is not a negative influence on acceptance can be sustained.

6.4.2.3 Situation-Specific Factors

External stakeholders were an important part of the internal decision processes, and, at the time of the research, none were acting to destabilise the college. As pointed out in chapter five, they operated as a clearly understood constraint on internal freedom of action. Both the main external stakeholders were supportive: the FEFC had agreed the previous funding allocation

(albeit on a different basis) and relations with the degree validating University were reported to be excellent (v).

However, staff clearly identified the internal decision process as being dictated by external constraints. Commonly the whole decision aiding system was described as necessary because of the demands of the FEFC, and equally staff were aware of how limited their internal freedom of action was precisely due to the weight of external issues. This attribution of the structure of the process to external factors rather than something imposed at the will of the senior management was clear in the interviews.

There is little evidence that **internal power relationships** influenced acceptance. The decision aid is not seen by any staff as an imposition of the college's senior management..

6.4.3 Relative Influence on Acceptance

Concerning the models developed in chapter three, if the generic factors are the sole cause of acceptance or rejection then in this case the **individual differences should have led to rejection** of the aid. However, the aid is still in use. Of the specific factors identified in section 3.3.1 the **influence of the problem type** and the **external constraints** were important. The former lessened the impact of any differences in that the current status-quo was an acceptable outcome despite disagreements with how it was reached. External constraints led to the lack of freedom about how the college could act. Its information systems were driven by the demands

of the FEFC and this conditioned how it supported its internal decision making. Overall the relationships hypothesised in table 3:4, can be summarised as (table 6:6):

Table 6:6 Hypotheses and Empirical Data

Factor:	Key Item of Evidence:	Finding:
Generic Factors	Will be disproved if find instances of disagreement with the decision aid but the aid is still in use.	Disproved, widespread disagreement with the aid but it is in use
Problem Type	Will be proved if find an instance of a progress decision with an aid with which there is expressed disagreement but it is still in use;	This maybe one of the major reasons why it is actually still in use, in that the current status-quo is a defensible position for most members of staff.
Decision Aid	Will be proved if there is evidence that the reason for disagreement is with the aid itself rather than the problem representation;	No clear evidence, there is disagreement as to the value of the aid but this also applies to the value of the resultant decision.
Situation Factors	Will be proved if there is evidence either that a given approach to decision aiding is being imposed or that the organisation sees itself as having little choice but to operate in a given way due to external constraints.	A feeling that there is little choice but to operate in this way maybe the other reason why an aid with which there is little agreement is actually in use.

This table repeats the main findings in table 5:6 (p. 148) and adds the outcome that problem type will influence acceptance along the lines argued in section 3.3.2. Overall this case gives further evidence that the generic factors on their own are **not** the reason for the acceptance or rejection of the aid. In this instance both the nature of the problem situation (with a sustainable status-quo) and the situational constraints combined to leave the organisation with little choice or desire to operate using a different decision aiding environment.

6.5 Conclusions

Returning to the goal for the research set out in chapter one, the intention was to conduct enough investigations until some valid findings started to emerge and a suitable methodology, which seemed to capture the main data required, was identified.

The approach used in the case reported in this chapter represents a significant improvement over that used in the cases in chapter five. The addition of the repertory grid approach elicited better qualitative data and provided a platform for evoking comparisons by the interviewees themselves. The approach was of value in uncovering how the decision aiding process was operated and developing a conclusion that there was little disagreement within the college about **how** the system worked. The questionnaires provided an essential step to corroborating both this conclusion and allowed the interviewees to give **value** judgements about the validity of the system and the resultant outcomes.

This can be fitted to the basic assumptions in social cognitive approaches (section 2.4.2) of the role of circumstance and social position in affecting judgements. A basically cognitive model would assume a direct relationship between thinking and acting (eg Eiser and van der Pligt, 1988) which forms the basis of simpler models of attribution theory. The social cognitive model still assumes a relationship between thinking and acting but that this is influenced by external issues. Here, the external issues are enough to convert agreement about the structure of the aid to disagreement as to its value.

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Having accepted that in this case it is disagreement with the value not the nature of the decision aid, there is still the second issue that this has not led to rejection. Two factors might be important here as the extent to which the status-quo effect has led to a diminution of disagreements and that the external environment leaves the college with little choice.

In summary, this case study supports the more complex of the two models in chapter three, seeing acceptance of decision aids in organisations as partly influenced by intra-organisational agreement but stressing the importance of the nature of the decision being made and external influences.

CHAPTER SEVEN: SUMMARY

7.1 Introduction

This thesis set out to expand the existing research into the acceptance of decision aids. In doing so, it also shifted attention from aids for personal decisions to decision aiding in organisational settings, primarily by developing the proposals of Brown and Vari (1992). This had consequences in a need to identify the potential influences and, to answer the thesis question, split these into cognitive and social as opposed to other criteria. Empirically, it was then necessary to construct a research methodology and conduct enough case-studies to confirm that this was a suitable approach. The main purpose of this chapter is to consider if these aims were achieved and to elaborate on the theory set out in the opening chapters.

This chapter starts with a summary of the original assumptions and then considers the extent to which the data reported in chapters five and six, especially the analyses presented in tables 5:6 and 6:6, support the theory developed in chapter three. Following this review, section 7.2.3 presents a refined and integrated version of the theories of decision aid acceptance initially laid out in section 3.2.2 and 3.3.2. The other focus in this chapter is to reconsider the effectiveness of the research methodology used in chapter six and consider how that now needs to be adapted to support future studies. This forms section 7.3.

Chapter eight then takes a more discursive consideration of the strengths and limitations to the thesis. In particular it considers if there are alternative explanations for some of the critical

assumptions and identifies ways in which this research can be developed.

7.2 Summary of the Findings

Section 1.2 (p. 4) set out a goal to “*develop a workable model which identifies the major issues and starts to have some predictive value*”. As has been discussed in section 2.3.1, only limited prior research was available that was directly relevant to this thesis. This was partly compensated by using the literature on decision making and social cognition about the extent to which given problem representations are shared between groups of staff in the same organisation. Nonetheless, the emphasis of the thesis fell on theory building and identifying potential research approaches, rather than theory testing and its subsequent development.

The **basic theoretical model** identified the cognitive and social (generic) factors with how problems are recognised and represented (section 2.4.1) and that this process is influenced by the current role and previous expertise of the individuals (section 2.4.2). This led to a way to test the underlying **thesis question** of “*are cognitive and social factors sufficient to explain the acceptance of decision aiding processes within organisations*”, as, if there was an association between the level of agreement and the acceptance of the decision aid then *the cognitive and social factors* could be held to be the cause of acceptance or rejection. So a high degree of agreement should lead to acceptance and a low level of agreement to rejection.

The *specific factors* imply a **relaxation of the assumption** of a simple association between

acceptance and agreement. In section 3.2.2 it was argued that the specific factors could be divided between those that might **either dampen or worsen** the effect on acceptance of the aid by any disagreements present. Factors that could **reduce** the effect of any disagreements included how an ongoing decision with accepted goals may be subject to less rigorous scrutiny (and indeed negative evidence may be disregarded) compared to how a new option is considered (section 2.4.1.3). Other factors include how the power relations in the organisation might lead to a situation where the aid was in use, despite being rejected by parts of the organisation or that the external environment left the company no choice but to act in a particular way and thus accept the decision aid despite misgivings.

It was also argued that a decision aid, depending on how it was set up, could **increase** the effect of any disagreements and result in a particular aid being more likely to be rejected. In this sense, the existence of a decision aid might alter the decision situation to the extent that the aid becomes the focus of debate. The approach presented in section 3.3.2 was that this was more likely if the aid used a high-level of technology or was based on decision theory and thus presented an unfamiliar environment to the decision makers.

7.2.1 Support for the Basic Assumptions

This section reviews the validity of the basic assumption of the thesis of whether there is **equivalence between aided and unaided decision situations**. If this assumption can be sustained then the normal influences on problem solving and decision behaviour will also affect

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acceptance or rejection of a decision aid.

It is possible to relate the outline of the decision making process sketched out in section 2.4.1 to the evidence gathered in the case-studies. Cases A (section 5.2.1.2, p. 128) and B (section 5.2.2.2, p. 129) provide information on the problem structuring process and this follows the expectations of section 2.4.1.2. In both there was a recognition, at least within part of the organisation, that a problem existed and an initial formulation as to the nature of that problem. This formulation was related to the *expertise of the individuals* and the *initial search* for a solution was to routines familiar to themselves. In this sense, both sought an IT-system based on the manual processes with which they were already familiar.

In cases A and C there was evidence of a cyclical decision process with the problem being reformulated as new options became apparent (case A) or new external events happened (case C). In case D (section 6.2.4), the response to changes in the external environment also confirms the expectation of decision making in what Beach (1990) calls a progress decision. In a progress decision there is a tendency to maintain the status quo if this is a valid option rather than revisit the basic premises of the decision. This effect can also be discerned in case C (section 5.2.3.3, p. 135).

Finally in cases A, B and D there was evidence that individuals' representation of the problem situation was related to their previous experiences and expertise. This mirrored their functional role in terms of involvement with the decision aid. Table 2:2 (p. 35) sets out a fairly typical

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theoretical description of the problem solving process and it is possible to relate the findings summarised here back to this. On this basis the claim of a similarity between aided and unaided decision making can be sustained and reasons for decision aid acceptance can be drawn from more general decision research findings and summarised in table 7.1:

Table 7:1 Similarity of Aided and Unaided Decisions

Theoretical Expectation:	Empirical Evidence:
<i>Problem Identification</i>	
Prior Expertise	Case A+B sought outside help precisely because they lacked internal expertise even if A had identified its problem internally; Availability of solutions, pre-recognition & implementation
<i>Cyclical Process</i>	Case A as the aid revealed new data analysis options these were pursued; Case C further problems identified as original decision implemented (not all the product of external changes); Case D monitoring process used to identify variations from planned outcomes.
<i>Status Quo Tendency</i>	
Continue as its convenient	Case C, continue with implementation despite external changes.
Less rigorous evaluation	Case C, acceptance of decision despite difficulties as most benefit; Case D accept current resource allocations as they allow continuation of status-quo.
<i>Individual Differences</i>	
based on role	Case A knowledge of subject expert as opposed to software designer; Case B differences between parents and consultant as to the need for change; Case D differences in how HE or FE staff saw the validity of the planning process.
based on grade	Case B differences within the family which ran the company; Case D differences in response and acceptance of decision aid on the basis of seniority.
<i>Nature of the decision rules</i>	Case C implementation of HE and growth of FE seen as fundamental aim for the college; Case D extent to which decision options are constrained by the external environment.

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7.2.2 Empirical Testing

This section considers whether the empirical data confirms either of the two models (sections 3.2.2 and 3.3.2) which were initially developed. The case studies reported in chapters five and six were set up to test which model formed the better fit to the empirical data. This has already been partly reviewed in tables 5:6 and 6:6. These tables are combined in table 7:2 to show which of the theoretical assumptions in table 3:4 can be supported from the empirical evidence.

Table 7:2 Hypotheses and Empirical Data

Factor:	Key Item of Evidence:	Finding:
Generic Factors	Will be disproved if find instances of disagreement with the decision aid but the aid is still in use.	Disproved, cases B1 and D, disagreement and acceptance
Problem Type	Will be proved if find an instance of a progress decision with an aid with which there is expressed disagreement but it is still in use;	Evidence in case D that the aid was kept in use precisely because the current status-quo was acceptable
Decision Aid	Will be proved if there is evidence that the reason for disagreement is with the aid itself rather than the problem representation;	No clear evidence, may have been relevant in both cases B1 and B2
Situation Factors	Will be proved if there is evidence either that a given approach to decision aiding is being imposed or that the organisation sees itself as having little choice but to operate in a given way due to external constraints.	evidence in B1 that external constraints were important in leading to adoption, evidence in case C that external constraints were an important part of the decision making process, in case D external demands left little choice in how the college could organise its decision support.

The rest of this section develops the evidence as to whether the original formulation can be sustained or for which areas the evidence is still unclear. Finally section 7.2.3 takes these

findings and develops a revised theoretical model which integrates the empirical evidence with the original theoretical assumptions.

7.2.2.1 Generic Factors

In section 3.2.1 (p. 65) the generic factors were described as the patterns of agreement and disagreement with the aid within the organisation. In effect, the cognitive and social factors of the thesis title. In case D two such potential patterns were explored:

- operational function within the organisation (section 6.2.1);
- managerial grade within the organisation (section 6.2.2).

It was proposed in section 3.2.1 that the users of a decision aid could be grouped into four categories of advisers, owners, users and others in terms of technical knowledge and organisational influence. These distinctions were (table 3:3):

- those with technical control over the decision aid (advisors);
- those with managerial control over the decision process (owners);
- those with significant involvement with the aid but limited control over it (users);
- those with only limited involvement (others).

In addition to directly testing this taxonomy of possible intra-organisational divisions, it was possible to explore the **validity of a number of related assumptions**, including:

- that those with a **closer involvement** with the decision aid can describe it in richer terms than others;

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- that those who **share organisational role** are more likely to agree with each other than with other members of the company;
- that table 3:3 represents a valid distinction as to the various **levels of interaction** with the aid.

Data on **involvement** can be drawn from case D, in particular from the analysis of the repertory grids. In these, as expected, staff who formed the categories of advisers or owners could develop much richer and more complex descriptions of the decision aid than other staff in the organisation (table 6:3, p. 162).

Data on **organisational role and agreement** was again specifically tested in case D. Section 6.3.2 reported that the staff who were advisers or owners were more likely to agree with the aid than other staff. Also, there was a tendency to agree with the representations of staff in similar roles rather than other members of the college.

The division between the various users as to their **level of interaction** with the aid was only properly tested in chapter six and the small sample, and nature of that particular aiding process, made it hard to explore all the variants. Overall, analysis of the various repertory grids and interview transcripts only really supports two aspects of the proposed division with the interviewees combined as "others" and "users" as opposed to "owners" and "advisers". It was especially problematic to identify a clear distinction between "owners" and "advisers" as, in this instance, they all share a role within the senior management team. However, there are some differences in their problem representations in their repertory grids. From this, retaining the distinction pending further testing is worthwhile, as it could be important when considering

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acceptance of a decision aid which is highly technical.

Although there is evidence for some of the assumptions about organisational role and different perceptions about the decision aid, the evidence for the influence of the **generic factors** on actual acceptance is mixed. In three out of five instances there was an association between observed levels of agreement with the aid and its acceptance. In two of these, the relationship was between agreement and acceptance (cases A and C) and in one between disagreement and rejection (case B2). However, the expected relationship broke down in two instances (cases B1 and D), in both there was disagreement but the aid was still used. This led to the **rejection** of the argument that cognitive and social factors are the sole cause of acceptance or rejection (sections 5.3 and 6.5). **Even so**, as argued below in table 7:3, the generic factors still play an important role in acceptance, just that their influence is tempered by other factors.

7.2.2.2 Problem Type

In section 3.3.1.1, it was argued that the most important influence of **problem type** on acceptance was that the existence of an already implemented course of action would dampen the effect of any disagreements if the current status-quo was sustainable. In consequence, if an acceptable outcome can be maintained, then there would be a distinct lessening of the effect of the expressed internal disagreements on acceptance.

Evidence in support of this can be drawn from cases C (5.2.3) and D (6.2.4). Each of these

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were instances of progress decisions in that they represented the most recent iteration of a decision route that had already been implemented. For case C this was the latest set of decisions before commencing the teaching of the third year of a degree programme and in case D it was the continuation of the previous years overall budget allocation. As a result both cases C and D were marked by a willingness to downplay negative factors if this meant supporting a current, broadly favourable, outcome.

7.2.2.3 Decision Aiding Process

By contrast, the case-studies found little evidence for the suggestion that the type of **decision aid** was a factor in acceptance (sections 5.3.2 and 6.4.2.2), though there were limitations in what was observed especially as there was no instance of a formal DSS. Following the definitions in section 2.5.1, three cases can be characterised as decision aid as model (cases A, B1, B2) whilst cases C and D can be described as an example of the aid as process.

The assumption made in section 2.5.1 was to identify decision aiding with Rohrmann's (1986) formulation as anything that assisted decision making rather than the narrower definition originally used by Cook (1992). The revised definitions suggested that there were three discrete types of aid that could, at least as to the technology involved, be seen as forming a continuum from formal DSS, through to IT-based models to interpersonal planning systems. Within this continuum, it was acknowledged that a decision aiding process might involve specific data systems as in case D (section 6.2.3.1). However, case D could indicate that this

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formulation is possibly wrong in expecting to find **one decision aiding approach for a particular decision**. Case D noted a division in the support process between how data was stored and how target setting and monitoring were conducted. Basically the former was IT based and quantitative and the latter interpersonal and qualitative.

Effectively the different elements of the decision process are aided in different ways, as:

- the **process** by which the decision is made;
- the **information sources** used to support the decision;
- the **rules** used actually to decide what solution is acceptable.

If this is correct then the **decision process** forms the overall system by which the organisation actually makes decisions. This can be the planning system uncovered in both D and C or, the unexplored, processes by which A and B actually made use of the outputs from the formal decision aids. The **information sources** are where an IT-based decision aid was found in cases A, B and D. Finally the **rules**, which determine the type of outcome acceptable to the organisation, will be the most interpersonal of the three phases with little reliance on IT except, of course, in an instance with a formal DSS.

The implication for further studies is that it is important to address the whole decision aiding process rather than, for example, an IT-based element within it. Otherwise, there is a danger of forming a misleading impression in confusing agreement or disagreement with a part, to the response to the overall process.

7.2.2.4 Situation Specific Factors

Situational factors (section 3.3.1.3) include the possibility that external factors or internal power structures could lead to usage even without widespread agreement as to the validity of the aid. Various cases identified external situational factors, in case B this was the financial crisis facing the organisation while in cases C and D it was the extent to which internal decision making was bounded by the demands of external stakeholders. As hypothesised in section 3.3.1.3 these acted to limit the freedom of movement of the organisation. So some staff in case D may have wanted to reject a decision aiding process designed to satisfy the FEFC, but were unable to reject the funding that resulted from operating in this manner.

However, in **none of the cases** were internal power relationships found to be a major issue in the sense that the imposition of the aid was ascribed to the wishes of the senior staff. In case D there is no evidence that any group really agreed with the aiding process although senior staff did so to a greater degree than others (section 6.3.2). However, no staff saw the process as an something freely chosen by senior management and then imposed on the college.

7.2.3 Combining the Two Models

Section 7.2.2 has shown which of the original assumptions can be substantiated because of the empirical data gathered. This material can also be combined to give a revised model of decision aid acceptance which fits the theory presented in chapter three as modified by the empirical

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findings in chapters five and six. The main aspects of this revised theory are:

- that the extent of **internal agreement will set the basic tendency** to accept or reject a given decision aid;
- this tendency will be tempered by the extent to which an **existing status-quo** can be sustained. If so then there is pressure to sustain this despite (latent) disagreements, in other words in a progress decision there is a tendency to downplay any disagreements;
- **external constraints** may have the effect of also leaving any internal disagreements irrelevant if the organisation has little choice but to operate in a particular way.

These can be combined to explain the observed results, and the revised model in table 7:3 starts from the assumption that the generic factors set up a basic tendency to accept (if there is agreement) or reject the decision aid. It then assumes that for an adoption decision this basic tendency is not modified so disagreements will lead to rejection and agreement to acceptance. However, in a progress decision there will be a tendency towards the status-quo and thus to acceptance. Finally if there are no external constraints then the basic tendency set by the generic factors (perhaps modified by problem type) will hold, otherwise the constraints will tend to minimise the effect of any disagreements with the decision aid on its acceptance.

Table 7:3 Theoretical Expectations and Empirical Outcomes

Case:	Internal Agreement?	Expectation	Problem Type	Expectation	Constraint	Expectation	Outcome
A	yes	accept	adoption	accept	none	accept	accept
B1	no	reject	adoption	reject	external	accept	accept
B2	no	reject	adoption	reject	none	reject	reject
C	yes	accept	progress	accept	external	accept	accept
D	no	reject	progress	accept	external	accept	accept

For example, case A is a simple instance in that there is a basic tendency to accept and this is

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left unmodified by either problem type or external constraints. Case D is slightly more complex in that the generic factors imply a tendency to reject the decision aid but both the problem type and external constraints meant it was accepted (grudgingly) instead. Case B1 is the most complex in that internal divisions and problem type left a tendency to reject the aid that was only balanced by significant external pressures. The lessening of these pressures in B2 led to the rejection of the second aid.

In summary, table 7:3 forms the **basis of a revised and integrated model** which in turn needs further empirical testing to see if it remains valid in other situations - for example are there instances of a progress decision which see the rejection of an aid? Nonetheless, it fits the empirical data reported in chapters five and six.

7.3 Evaluation of the Research Methodology

Chapter four explored the context for this research in terms of the underlying philosophy (section 4.2.1), the implications of conducting research in organisations (section 4.2.4) and a review of the methodologies used in this, and similar fields, in previous research (section 4.2.5). From this, and the nature of the research question, it was argued that the empirical research would be most effectively conducted using approaches and assumptions drawn from research in organisations which has taken a social cognition bias (section 4.2.5.3).

This led to an acceptance of a qualitative enquiry based around case-studies (sections 4.2.3 and

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4.3). Specifically it was argued that the best way to reflect the individual representations of the decision aiding environment was to use Personal Construct Theory and show these beliefs as Repertory Grids (section 4.3.1). The repertory grids were compared (section 4.3.2) by adapting the methodology proposed by Daniels et al (1994). Finally less structured data was gathered from interviews and was analysed to corroborate these findings and to explore the specific factors that influenced the situation being studied (section 4.3.3).

The logic behind this research approach is that since the decision aid imposes a “certain structure” (van der Heijden, 1997, p. 186) on the problem, the repertory grids then become the individual’s representation of the nature of the problem as represented in the decision aid.

From this can be drawn information on two areas of similarity or difference between individuals:

- the gap between their own repertory grid and those of other staff (ie how they score agreement on the questionnaire) forms *a measure of how shared a particular representation of the decision aid is;*
- the extent to which they indicate *agreement with the aid is a measure of how accurately they believe the decision aid represents the structure of the problem.*

However, the methodology used in chapter six is the ideal enquiry technique and there was a need to conduct an exploratory phase to develop this approach. These theory-building enquiries were constrained by the access that could be negotiated and the information sought at that particular stage. Ideally the empirical base for this thesis would be several case-studies conducted using the research methodology employed in chapter six, more realistically constructing both a theory and a workable methodology was a process of trial and error. This

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saw considerable iteration between the findings that emerged from the early case-studies, reported in chapter five, and the developing theory. These early cases were particularly useful for identifying what could constitute the *specific* factors and, by default, pointed to how to gather information on the *generic* factors. In particular they:

- developed a broader view as to *what constituted a decision aid*, especially that it did not need to be directly linked to the choice process but could operate in a background, advisory, manner;
- helped to develop the argument that there were likely to be *different responses to the aid dependent on the level of involvement* and control;
- developed awareness that the process of *decision making with an aid was not that different to unaided decision making*;
- identified some of the *situation specific factors* which might influence acceptance, especially the existence of external pressures as a constraint on internal actions.

The weakness of the cases in chapter five was a failure to conduct a rigorous exploration of the nature of individual beliefs and how these might vary within the organisation. This was only done using the final case reported in chapter six. This case varies significantly from the others in that it sought to test the emergent theory and used a research methodology explicitly designed to gather the needed data on individual differences.

7.3.1 Did the revised Methodology succeed?

This section concentrates on the implication of the research methodology used in chapter six rather than those reported in chapter five. The logic being that this final case was actually conducted in a manner designed to elicit the information needed to address the research

question. Consequently it is important to review the extent to which this succeeded and how the methodology might be developed for future use.

Previous enquiries into cognitive and social reasons for decision aid rejection (section 2.3.1.1) have rarely moved beyond suggesting possible empirical approaches (eg Brown and Vari, 1992). In consequence, it is not practical here to compare the approach used in this thesis with that used in other studies. Instead the approach must be tested in a self-referential way, in particular: does the research answer the central tests of **validity, reliability and generalisability**? To recap from table 4:3 (p. 95) these have been defined as:

- **Validity**, has the researcher gained full access to the knowledge and meaning of the participants?
- **Reliability**, will similar observations be made by different researchers on different occasions?
- **Generalisability**, how likely is it that ideas and theories generated in one setting will also apply in other settings?

7.3.1.1 Data Gathering

The process of data gathering involves answering concerns of **validity and reliability**. For research in an organisational setting (section 4.2.4.1), there is a need to strike a balance between the volume of demands on the organisation and the need to capture the data in a rigorous manner (Jenkins, 1998). For example in chapter six, the repertory grids were constructed, less as a full and exhaustive representation of the individual's representation of the decision aiding process, more so that they held enough data to allow meaningful comparisons

between the individuals (Jenkins, 1998). Equally one of the attractions of Daniels et al (1994) approach was that it removed the need to arrange a follow up interview.

The **validity** of the case reported in chapter six rests on three different strands by which data was gathered. These included an unstructured interview, a repertory grid completed with elements and constructs identified by the interviewee and a follow-up questionnaire.

Respondent validation (Bryman, 1989) was also used to check agreement both with individual transcripts and the layout of the repertory grids.

The **reliability** of case D, especially in as far as it might be replicable by another researcher, is greatly enhanced by using repertory grids to represent the findings and as the basis for much of the analysis. Many researchers (eg Adams-Webber, 1979; Bannister and Fransella, 1986; Gammack and Stephens, 1994) have found the structure of repertory grids to be stable in the short term and relatively unresponsive to changes in the external environment. So if the original enquiry was conducted properly, a follow-up intervention within a reasonable time-span should find much the same pattern of beliefs in response to the same question.

7.3.1.2 Data Interpretation

The process of data interpretation in a qualitative enquiry must address concerns of **generalisability** and here use has been made of Yin's (1994) pattern matching methodology to develop a theory from the empirical data (section 4.4). However, even so, strictly all that can

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be claimed is that in the case studies conducted certain relationships were observed. Even with this limitation, pattern matching is a useful tool to relate the empirical data to theoretical expectations so as to develop a revised theory (table 7:3). In addition to being used to interpret the empirical results to discriminate between the generic and specific factors, it was also used to identify just what were the specific factors in each case. It has also been used to derive table 7:1 and thus compare the decision processes found in the cases with that predicted in section 2.4.1 to sustain the argument of close similarity between aided and unaided decision making.

Comparing the empirical findings with the theoretical predictions in table 3:4 was a central element in the process of interpreting the results of the case-studies. Thus section 6.2 defines the meaning of key terms such as the nature of the decision aid, the problem situation and the level of agreement so as to support the discussion later in that chapter. In turn, section 6.5, for example, was then written to draw together the observed data to construct an argument as to the causes of why the aid was accepted and used despite disagreements.

7.3.1.3 Summary

Overall the conduct of Case D does fit the requirements of validity, reliability and provides a basis to generalise from the findings in so far as this is ever sustainable. It can be argued that the methodology yielded data on the nature of the current decision aiding process in use in the organisation and on the extent of intra-organisational agreement with that decision aiding process. It gave evidence about which parts of the organisation were most likely to agree with

the aid and this confirmed the structure proposed in table 3:2. The research design also satisfied the goals set out in table 4:1.

7.3.2 Future Developments of the Research Approach

In section 7.3.1 it is argued that the methodological approach used matches the tests suggested by Yin (1994) as the basis of valid case-study research. Equally it is a methodology that has been used in other studies into individual differences in an organisational setting. However, this section now concentrates on refining the methodology to address the revised model presented in table 7:3.

Overall there is **no reason to move away from the basically qualitative** approach advocated in chapter four. There is still a need to gather information on individual differences and on the nature of the situational factors including external constraints. This can be done in organisational settings using the basic design of combining unstructured interviews with Personal Construct Theory. However there are five areas where the methodology used so far needs to be reconsidered:

- the precise nature of the **question posed** for the repertory grid;
- reconsider just what the process of **comparing cognitions** achieves;
- **who should be interviewed**;
- **sample size**;
- **calibration of the scales**.

7.3.2.1 Nature of the Question

The **question posed** to the interviewees before they start to identify the elements of their grid is central to the success of any application of the repertory grid technique. There are two concerns about the nature of the question posed. First, the question must be unambiguous. Otherwise, interpreting subsequent constructs and scales is hard. Equally, and of real importance for the methodology adopted in this thesis, it leads to ambiguities in what is being compared. The second concern is that, despite the suggestions of Stewart and Stewart (1981), it is hard to construct a meaningful grid around a hypothetical question. Respondents then find it difficult to disentangle elements from constructs (something which, with little prompting, they can do otherwise) and again this leads to ambiguities in the scales and scoring.

However, the nature of the question is of **concern** for more than just technical reasons of constructing the repertory grid. Hodgkinson (1997), in a review of cognitive approaches to the study of strategy formation, consistently notes that research using PCT has a risk of overstating the degree of surface (ie apparent) disagreement at the cost of ignoring underlying agreement within the organisation. This can be controlled by using multiple sources of evidence and through taking care to make the question posed as neutral as possible. Equally controlling for this may become easier using the reformulation of the structure of a decision aid now suggested in section 7.2.2.3. This might help to avoid a false assumption of disagreement derived from concentrating on just one aspect of the decision.

7.3.2.2 Comparing Cognitions

Huff (1997) identifies **comparing cognitions** as a major issue in this type of research. The approach here was to let the interviewees generate their own comparisons, using a questionnaire, with the repertory grids of all the interviewees attached. They were then asked to rate each repertory grid as to how much they agreed with it. Since each grid was a representation of each individual's belief as to the structure of the decision aiding process then the response underpinned a statement of agreement with that particular representation.

In this instance the repertory grids were collected as individual representations of the decision aiding process used within the college. This is relatively straightforward but then what was being compared? In effect, this was whether or not another respondent had described the college's decision processes in a manner with which they agreed. The step that follows is to argue that this is the same as agreement as to the nature of the college's decision aiding processes. So each member has represented **their** version in their own repertory grid, and what is done is to ask what level of shared understanding of this exists.

Given the theoretical and philosophical assumption in this thesis of a socially constructed reality, which makes a distinction between concrete objects (ie the decision aiding process) represented in subjective language (ie how the decision aiding process is described) then it is valid to use, as the basic description of the decision aid, the language of the individuals. A different viewpoint could start from the assumption that what is needed is to present a formal

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description of the aiding process to staff in the organisation and ask them if they agree with this. The flaw in this is **whose language is used to describe the aid** and are you then measuring agreement with the language or the aid?. A complementary flaw in the approach used in this thesis is that you are not measuring agreement with the aid as such, but with the way different staff have described it. The advantage though is that this agreement or disagreement with these perceptions underpins collective agreement as to the nature of the aid.

The other requirement was to allow separate judgements as to the structure of the aid and its perceived value. As found in chapter six, this could prove to be an important distinction to sustain. However, to achieve this degree of explicit evaluation it proved to be necessary to add specific questions to the questionnaire which forced the respondents beyond comparing agreement with each others repertory grids.

7.3.2.3 Who should be Interviewed

These are general points applicable to any similar enquiry, but it is also possible to identify issues relevant to the research aims of this thesis. The first is why interview the "others", that is staff without direct involvement or control over the decision aiding process. Initially the logic appeared strong for this, in that they form part of the structure of table 3:2 and there is a need formally to test whether their representations are different to the staff more closely involved. The problem is that, as with many people who are being interviewed on a topic outside their immediate area of knowledge, these interviews seemed uncomfortable experiences and they

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required reassurance that their views were indeed of value. This is a hard point to resolve, but in future iterations not interviewing this particular group might be appropriate.

7.2.2.4 Sample Size

This, in part, leads to the **question of sample size**. Given the nature of the enquiry, and the type of data that can be captured using repertory grids, it is feasible to conduct this research using small numbers of interviewees (Reger, 1990b). What is important though is that the sample forms the right group of people. Taking the option to exclude the "others", then further iterations of this research should concentrate on the three groups of advisers, owners and users who could be held to constitute the decision making community whose opinions will directly influence acceptance or rejection.

7.3.2.5 Calibrating the scales

The level of agreement with the aid in case D is described as low from the responses to the questionnaire. It may prove from repeated use that an average level of agreement, on a scale from 1 to 5, of 3.38 (3 being neither agree nor disagree) actually is quite high. In this instance the attribution of low levels of agreement to this score is supported by verbal information gathered during the interviews. However, only repeated use of this measure will help **calibrate the attribution of a given level of agreement to certain scores**.

7.4 Conclusions

Clearly, the hypothesis advanced in section 3.2.3, that the generic factors are the sole reason for accepting or rejecting a decision aid, should be rejected as the reasons for decision aid acceptance are more complex than just being associated with the differences of opinion within the organisation. However, if there is no simple linkage between the generic factors and acceptance then neither does any other factor explain acceptance nor rejection on its own (table 7:3). In summary, potential factors were identified including intra-organisation agreement with the aid, the problem situation, the type of decision aid and internal and external constraints on organisational choice.

CHAPTER EIGHT: CONCLUSIONS

8.1 Introduction

Chapter seven has summarised the extent to which the main findings of the case studies reported in chapters five and six confirm the theoretical expectations set out in chapters two and three. The revised model outlined in table 7:3 was developed through combining the initial theoretical structure with the subsequent empirical results. The theory-building nature of this thesis meant that the **original goal** was the specification of such a model that encompassed the main variables rather than actually testing this model. In this it reflected the expectations of Brown and Vari (1992). A related aim, which also came from the lack of previous studies, was to identify a suitable methodology that could be used both to derive the revised model which, with further amendments, might be suitable to carry out further testing.

This chapter now considers how the model in table 7:3 advances the original theoretical understanding of this domain and is divided into two sections. Section 8.2 looks at the strengths of what has been achieved and section 8.3 considers the limitations and the developments now needed. Within this overall structure, section 8.2.1 compares the findings with the original theoretical state before commencing this thesis, section 8.2.2 considers what lessons can be drawn for potential developers of decision aids and section 8.2.3 looks at other applications of the research methodology. Section 8.3.1 discusses if there are alternative explanations for some of the basic assumptions made and, in section 8.3.2, the limitations in what was achieved mainly because of the theory-building nature of the thesis.

8.2 Developments in this Thesis

This section does not repeat the summary of the research findings presented in sections 7.2.2, or the revised model in section 7.2.3, but instead sets out to review:

- the extent to which this thesis has developed the theory in this field;
- who is this research of value for;
- are there alternative uses for the research methodology.

8.2.1 Development of the Theory in this Thesis

Section 2.3.1. presented a detailed review of four articles that form the baseline for this thesis. Three of the articles (Rohrmann, 1986; Brown and Vari, 1992; Watson, 1992) reviewed existing literature, proposed potential reasons for limitations in how acceptable a decision aid is in an organisational setting and ways in which further enquiries could be conducted. The final article (Timmermans and Vlek, 1992) reported an update of a study originally carried out by Bronner and de Hoog (1983) of the reasons why decision aids might be rejected by individuals when making personal decisions.

8.2.1.1 Previous Theoretical Position

At the time of starting this thesis in 1993, there was very little consideration of decision aid acceptance in organisations within the decision making literature. In developing the theoretical base for this thesis it proved practical, as was done in section 2.3.2, to use studies of adoption

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of processes as diverse as IT, strategic planning and techniques in management accounting. Also, as in sections 2.4.1 and 2.4.2, it was possible to find significant amounts of material, in the literature on problem solving, decision making and aspects of social cognition, to form the underlying theory presented. In consequence, this thesis has borne out Brown and Vari's (1992) expectation that such "research will often be interdisciplinary and divergent, in the sense of seeking rich and exploratory, rather than narrow and definitive, findings" (p. 43).

The material in chapter two was combined to identify potential influences on decision aid acceptance such as the nature of the problem, the decision making environment and the nature of the decision aid itself. However, what was not done at that stage was to produce a set of **causal relationships** and the empirical work in this thesis sought both to achieve this and to test the validity of the underlying model set out in chapter three.

8.2.1.2 Advances on Previous Theory

As expected the findings of this thesis are exploratory and tentative and the limitations that result from this are discussed later in this chapter. Nonetheless, this thesis represents a valid response to the theoretical and practical issues raised by Brown and Vari. In both theory development, and testing an empirical approach, this thesis does represent an addition to the literature on the non-IT factors that will influence decision aid acceptance in organisations.

The net effect of the theoretical development is table 7:3 that suggests the various ways in

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which intra-organisational agreement with the aid, problem type and situational factors combine to influence acceptance in organisations. In effect, it now offers an **embryonic causal model** of decision aid acceptance. Such a model needs further testing to see if it remains valid under other combinations of specific and generic factors and equally whether the type of decision aid or internal power relationships actually are significant factors. However, even so it represents a development over the position reported by Rohrmann (1986) and Brown and Vari (1992).

The other way in which the thesis represents an advance over the position at its commencement is the **adaption and usage of a research methodology** which can both measure intra-organisational agreement and relate this to situational factors. In this, the thesis forms a bridge between methodologies devised to support social cognitive research in organisations and behavioural decision research in an organisational setting. This is valuable given that the previous emphasis on studying decision aid acceptance from a decision making perspective has tended to be individuals making private decisions in experimental settings.

Besides its role in identifying influences on decision aid acceptance, section 3.2.2 also set a goal for the empirical enquiry of testing whether different perceptions of a problem are related to the organisational role of the individuals. This was particularly done in chapter six. The findings support those of Reger (1990a) and Daniels et al (1994) in uncovering shared representations linked to the grade of the individuals. It also confirmed that individuals with different grades are less likely to agree with each other.

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Overall this thesis has concentrated on constructing a basic theoretical model, and then testing the implications of its descriptions about what might influence acceptance. This has included the idea of dividing potential reasons into the generic and specific factors. What it has left undone is a further testing of their relative importance. A consequence is that it is inappropriate to say that what now exists is a theory of decision aid acceptance. In Bem and de Jong's (1997) terms it remains a model. The model has been improved from that suggested in chapter three but it still remains a model. The current position can be summarised as (table 8:1):

Table 8:1 Summary of Research Findings

Original Assumption	Evidence
Cognitive and Social Factors are the sole influence on the acceptance of a decision aid:	They are an important influence but their effect is filtered by situational factors.
The effect of a sustainable status quo will be to limit the impact of any disagreements on the acceptance of the aid:	Supported, at least one case has found significant disagreement but the aid is accepted because the previous outcomes can be sustained.
If the decision aid is highly technological or based on decision theory it is likely to be rejected on these grounds alone:	No evidence for this due to nature of case-studies but it is a theme common in the literature.
External and Internal constraints may force acceptance of the aid:	Evidence for the role of external constraints is strong, no evidence in the cases studied of a decision aid being imposed by senior management.
Those more closely involved with the aid will be able to describe it in richer terms:	Supported.
Those more closely associated with the aid will be more likely to agree with it:	Supported.
The taxonomy of users into advisers, owners, users and others is valid:	Mixed evidence, confirmed for a three way split between owners-users-others but unclear for a split between owners and advisers, possibly due to nature of the particular studies.

Table 8:1 summarises which of the original assumptions made in the thesis (particularly in

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chapter three) have been supported by the empirical evidence in chapters five and six. It also points to the importance of not just relying on empirical evidence at the expense of ignoring arguments that are consistently reported elsewhere. In particular the available literature stresses that the technology behind the aid can be an important influence on acceptance, though this was not found in the individual cases studied.

8.2.2 Audience for this Research

It is worth reconsidering whom this research is actually for. It was noted in section 2.2 that one reason for researching the acceptance of decision aids is the potential to improve decision making if the aid is properly implemented. This suggests that there are three potential audiences - decision makers in organisations, those responsible for decision aid design and other researchers in this or similar fields. In practice, the theory building nature of the thesis has limited the extent to which it has produced conclusions of direct relevance to the first two groups. As it stands its major contribution is to take concepts and methodologies from social cognition and apply these to the issue of decision aid acceptance.

However, it does have some relevance both to decision makers and those responsible for the design of decision aids through identifying a number of issues that will influence the perceived acceptability of a decision aid:

- the *existence of individual differences* are of particular relevance for decision aid acceptance. In effect they are the product of different specialisms and grades

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- within the organisation and thus not easily ignored or overcome;
- from this, those designing and promoting decision aids need to take account of *alternative problem representations* and decision rules within an organisation. This goes beyond the need often identified in IT-design to encapsulate the views of the users, in particular it is as much an implementation as a design issue;
- a common concern in the IT-literature is for the aid to embed the views of the users if it is to gain acceptance, this thesis suggests that care needs to be taken in *defining who is the user*;
- linked in part to this, even if a shared view as to the nature and purpose of the aid can be achieved, this still leaves the potential for disagreement as to its value;
- although this thesis has identified instances where there is usage of a decision aid without acceptance, in one instance all members of the organisation were content to accept the current status-quo. This basic acceptance might not be present in *more contentious situations*, for example, where decisions on organisational retrenchment are being made.

8.2.3 Empirical Developments

Besides further testing of decision aid acceptance in organisations using a revised variant of the current methodology, it is possible to identify several themes from this thesis which could form the basis of future studies.

8.2.3.1 Distinction between Generic and Specific Factors

One theoretical issue that might be pursued is the distinction of factors which influence decision making into generic and specific. This was done somewhat arbitrarily to form a basis for splitting cognitive and social influences from other factors that might influence the acceptance of a decision aid. It is, however, an interesting idea which is worth further study. This could be conducted as either a literature review or the distinction could be used as a means to study decision dynamics in a variety of circumstances.

8.2.3.2 Testing Elements of Image Theory

As already flagged in section 2.4.1.3 this thesis was not designed as an empirical test of Image Theory. However, the methodology has resulted in access to what, in its terms, are described as **progress decisions in organisations**. This contrasts with the majority of the empirical work on Image Theory that has concentrated on the compatibility test as applied in laboratory conditions to the adoption of new options and, this potentially offers a significant opportunity to test it in a different situation.

If this were to be done then there would be a need to shift to using a longitudinal research design. Image Theory is weak in predicting behaviour in specific circumstances until the relevant images have been identified and both Watson (1992) and Payne et al (1993a) argue that this is a particular limitation to its validity. However, this weakness could be overcome through a longitudinal study with the intention to conduct one study to gather information on the main images (value, trajectory and strategic) and the extent to which these were shared. A follow up study should then find one of two outcomes:

- the organisation has *continued with its earlier decision*, if so then the need would be to understand why. Is it because there has been no change in the external environment or is it because there was a choice to persist. In either case the images will become predictive in the sense that they will dictate subsequent behaviour;
- the organisation has *ceased to persist with its earlier decision*. Here there is an expectation, especially if this led to changes in the value image, of significant internal debate and perhaps unhappiness with the new course of action.

8.2.3.3 Testing the Process of Frame Modification

The idea of follow up longitudinal enquiries could also have value in testing aspects of frame formation and stability over time. In this case the aim would be to gather initial representations of the problem and then to repeat this at a later stage and check the level of agreement between time periods and also at each stage. Although repertory grids are of limited use in uncovering the evolution of beliefs, they are a valuable means to report on them at certain stages. The intention would be to gather repertory grids at two intervals and not only report on intra-organisational agreement at each stage but also changes over time. Within this, at least two potential options could be explored:

- testing whether over time (in a stable situation) *frames of different individuals will change so as to reflect those of other actors*. Here the test would be whether or not the extent of any disagreements as measured using the questionnaire had reduced between enquiries;
- testing the process of *frame modification over time*. One of the little understood concepts about framing is how they are modified. Returning to the college in chapter six, gathering data again on the current decision environment and then comparing the sets of grids should give a picture about how responsive these are to external changes.

8.2.3.4 Other Applications

Several other research lines are also open using the basic findings and/or approach of this thesis. One is to use the methodology to consider, for example, the factors which may affect the limited adoption of **Activity Based Costing (ABC)** in public sector organisations (Cropper and Cook, 2000). The literature in this area has tended to emphasise the importance of the

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difficulties in constructing the technical accounting models (Cobb et al, 1992) but there is also evidence that personal and organisational factors play a role (eg Friedman and Lyne, 1998). In the same vein, both the basic approach and theoretical orientation could be applied to issues connected with the acceptance or rejection of major new IT systems (Hinton and Kaye, 1996). A further option would be abandon the focus on the acceptance of decision aids and use much the same approach to add to the evidence for reasons why certain options are adopted or rejected as valid solutions within organisations.

8.3 Limitations

8.3.1 Alternative Interpretations

The basic logic in the development of the model represented in table 7:3 is to compare the empirical results with the rival theoretical models offered in chapter three. From this the basic hypothesis, that the generic factors are the sole cause of acceptance or rejection, was rejected and instead a hybrid model that combined elements of the generic and specific factors was developed to fit the empirical findings. This section considers alternative explanations for the three basic assumptions used in developing the revised model:

- what does the methodology measure agreement with?
- are the cognitive and social factors correctly defined?
- is the issue of power in organisations appropriately handled?

8.3.1.1 Measuring Agreement with the Decision Aid

Whether the methodology really did **measure agreement with the decision aid** is critical and has already been discussed in section 7.3.2.2. In section 4.3.1.3 it was argued that this agreement could be measured by gathering a repertory grid showing the individual's representation of the aid and then asking all the interviewees to complete a questionnaire rating their agreement with the repertory grids of their colleagues..

However, the concern is not just a simple issue of considering if the repertory grid correctly measured each individual's view of the organisation's approach to decision aiding. To a certain extent this is relatively easy to answer through an evaluation of the appropriateness of the question posed. In case D this was "*what are the main aspect of the College's information/decision aiding systems*".

As formulated, this question sought to address Hodgkinson's (1997) concern that repertory grid techniques may tend to overemphasise the extent to which individual's have differing representations. This was done by posing a neutral question which not only allowed the individual to report their own beliefs but also to construct the decision aiding process in a way which was meaningful to them. They were not, for example, directed to describe their understanding of a particular element within the decision aiding process. This helps to avoid the danger that the questioning might be focussed on a single part of the decision aiding process, and thus possibly stress disagreement with this, rather than agreement with the overall

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decision aiding approach despite concerns over a given element.

The larger issue, which is more problematic, is how was **agreement with the decision aid measured**. The argument, rehearsed in section 7.3.2.2, is that each grid represents each individual's view of the decision aid. What is gathered is an appreciation of how accurate this perception is in the view of other members of staff. If all staff understood the decision aid in the same way then presumably everyone would have generated essentially similar repertory grids only distinguished by nuances of language and this agreement will show in the responses in the questionnaires. Differences between the individuals will show both in the language and structure of the repertory grids, and in the questionnaire returns. As already discussed this is valid if it is accepted that what is important in leading to agreement or disagreement is the individual's perception as to the value of the decision aid and the extent to which they believe their representation is shared by their colleagues.

8.3.1.2 The Description of the Cognitive and Social Factors

The attribution of **cognitive and social factors** to how individual's conceptualise and share problem representations lies at the centre of much of the argument underpinning this thesis. Again is this correct? The distinction is arbitrary and was constructed for this thesis in the same way as labelling factors between the categories of generic or specific.

The logic is that whilst the process of problem formulation and solution generation is personal

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(although it is influenced by social issues), the way in which consensus and shared agreements is reached is interpersonal. Thus as a short hand problem formulation is labelled as the cognitive factors and the process of intra-organisational agreement the social factors.

Equally working with the generic/specific factors argument forms an arbitrary distinction to separate the cognitive and social influences from other concerns. It was a product of the understanding of reasons for acceptance that existed at the start of the thesis, in particular the emphasis placed on intra-organisational agreement by Cook (1992).

The goal was to separate those factors which influence the process by **which all problems are represented** and potential solutions evaluated from those that apply in specific instances. The generic factors affect any problem, whether it is a simple puzzle or a complicated strategic decision concerning organisational retrenchment. On the other hand not **all decisions are the same**: some are new and some are ongoing; not all are aided and there are different ways in which they can be aided; some have no external context and others are heavily influenced by external constraints. The basic decision making process will be influenced depending on which of these variants applies in the particular case.

8.3.1.3 Power in Organisations

Understanding the nature of **power** proved troublesome throughout this research. In part this is a consequence of the focus of this thesis, which has been on individuals, while the literature

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on power tends to deal with groups. The assumption used in this thesis is that power is the means to impose something and as such the subtlety of whether this imposition is a direct act of coercion, or an assumption built into the decision environment which rules out certain options, has been left to one side.

The problem is in how to measure the influence of the latter. If it is the simple case of imposition then the expectation will be of intra-organisational disagreement with a split between the owners who do agree and other staff who do not. This might then be supported by interviewees reporting their belief that the aid was imposed by a management decision.

8.3.2 Other Concerns

Other concerns are mainly related to the theory building nature of the thesis. This led to limitations in what has been studied (section 8.3.2.1), the focus of some of the early case-studies (section 8.3.2.2) and that more empirical work is now needed (section 8.3.2.3).

8.3.2.1 Issues not studied

Several limitations come from the theory-building nature of this thesis. An obvious need now is for more empirical work, using the amendments suggested in section 7.3.2, to test the validity of the revised model of decision aid acceptance in section 7.2.3. Other issues which need further testing include:

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- whether table 3:3 as structured is *a valid taxonomy of the users of a decision aid* - should it be simplified or even expanded to capture more subtle differentiations?
- whether *industrial type (or size) is an important variable*. It was originally ignored but could be relevant especially given the absence of a high-technology organisation in the current evidence base;
- whether the *questionnaire could be restructured* to include other variables? Options in this respect may include using length of service as a proxy for the extent to which the individual is socialised to the organisation's norms.

8.3.2.2 Nature of some of the Case-Studies

Further **consequences of the theory-building** approach include limitations in the conduct of some of the case-studies, especially those reported in chapter five. In both case A and B there are significant methodological weaknesses that led to the results being treated with caution.

None of the theory building cases (A, B or C) directly gathered information on intra-organisational agreement using the methodology outlined in chapter four. The main answer to these concerns has been to rely mostly on data from case D in revising the original model and to use the earlier cases as either corroboration or to point up possible alternatives.

8.3.2.3 The need for more Research

By its nature case-study research carries no implication of how many instances will be conducted. Given that it is no longer possible to generalise, as can be done from statistical sampling, then the logic of any resultant theory is not strengthened by repetition. Here it was decided to stop conducting case-studies once an appropriate methodology had been designed

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and tested. Further studies would have been useful in calibrating the scales used and perhaps uncovering different combinations of factors and outcome.

8.4 Final Words

The natural conclusion to a thesis with a theory-building bias must be to acknowledge the need for further work to test and refine the resultant findings. To restate, the bulk of this thesis has been concerned with developing a theory base and research enquiry technique to allow an investigation of the basic question. In structural terms there was a belief that this stage was reached by completing the empirical work reported in chapter six.

Practically this must mean there is now a need for more empirical work, whether repeating the same style of investigation or picking up some of the subsidiary issues uncovered.

Acknowledging this is not to underestimate what has been done so far as, even in its current embryonic state, there are interesting findings. The empirical data supports the more complex of the two models of decision aid acceptance originally advanced but acknowledges the importance of the influence of intra-organisation agreement on subsequent acceptance or rejection of the aid.

Overall, this thesis is **interesting** because it does address an area which has had little coverage to date. In as far as the issue of decision aid acceptability has been explored in previous studies this has tended to concentrate on acceptance by individuals for personal use. There have been

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few attempts to go beyond this and seek to test the factors that will influence the acceptance of decision aids in an organisational setting. In its final iteration, the legacy of this thesis is a methodology that seems promising and the identification of what may be the key factors and their dynamics.

From this the need now is clearly for **further studies** to test the validity of the assumptions offered in this thesis. As such these might chose to adopt a totally different methodology and indeed to identify different causal factors but at least this thesis can then make the contribution of being a new baseline to be rejected. On the assumption that the basic style of enquiry is to be repeated then there is a need to try to be selective about the cases to seek to cover combinations not reported here. A particular need will be to consider the factors influencing acceptance of a formal DSS that is a conspicuous absentee in this research. In a simpler sense there is also a need for further repetition of the basic design to test its robustness and to start to produce a means to calibrate some of the scales.

Overall, as summarised in table 8:1, this thesis has identified that intra-organisational agreement with the validity of the decision aid is an important factor in influencing acceptance. However, it is not the sole cause, in particular there is a weak association between disagreement and rejection. In this instance the extent to which the current outcomes can be sustained, and are seen within the organisation as acceptable, is important as is the extent to which the organisation feels itself to be constrained by external factors to act in a particular way.

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ANNEX ONE:

BACKGROUND MATERIAL FOR CHAPTER FIVE

Contents:

Background Material for Case A

Pages 1-A-1 to 1-A-5 Notes produced at end of consultancy

Background Material for Case B

Pages 1-B-1 to 1-B-4 Examples of pages of spreadsheet system

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Pages 1-B-16 to 1-B-18 Notes produced at end of consultancy

Background Material for Case C

Page 1-C-1, Follow up letter sent to all staff

Pages 1-C-2 to 1-C-4, interviewee Ci, interview notes, response to follow up letter

Pages 1-C-5 to 1-C-8, interviewee Cii, interview notes, response to follow up letter

Pages 1-C-9 to 1-C-10, interviewee Ciii, interview notes

Pages 1-C-11 to 1-C-12, interviewee Civ, interview notes

Pages 1-C-13 to 1-C-15, interviewee Cv, interview notes, response to follow up letter

Pages 1-C-16 to 1-C-17, interviewee Cvi, interview notes

Pages 1-C-18 to 1-C-20, interviewee Cvii, interview notes, response to follow up letter

Consultancy Notes

Introduction

This opportunity arose from a chance encounter. In fact, walking into a colleague's room and being asked if I knew of someone in the computer department who could design a spreadsheet system. Instead I volunteered myself.

Following this I visited the premises and met two people. We had a long, 2-3 hours, conversation in which they described what they wanted - this was already somewhat different to the original specification. I then quoted a very high price so we reviewed what was needed to make the whole thing more manageable. Subsequent dealings were just with one person who then dealt with the company's management (in the Cayman's). Mostly this was a process of refining the programme, adding new routines and chasing/eliminating bugs.

The whole consultancy took about 3 months.

Initial Aspects

The part of the company's business with which I've been involved is the management of portfolios of investment funds and bonds for a (small) number of clients. These are held in a number of formats and currencies. Initially, emphasis seemed to be placed on needing to report by client and to handle currency fluctuations.

Much of the initial conversation revolved around what the key aspects of funds and bonds were and how they wished this to be reported. There was also a technical conversation as to whether to use Excel or Lotus 1-2-3. I expressed neutrality but explained that my expertise lay with the former there could be some problems converting (especially macros). As the member of staff who would be using the system had no experience with either package we agreed that they would use Excel ⁽¹⁾.

There was a latent debate at this stage as to whether a spreadsheet or database system would suit their needs better. Advantages of a spreadsheet were the ease of numerical manipulation (some pretty complex formulae concerning rates of returns on bonds etc) and the visual aspect. Obviously a database would ease data manipulation and repackaging.

Shifting to discuss money provoked a new round of thought. This was pretty deliberate on my part as they failed to grasp the difference between constructing a complex 'shell' system and fully automating data input and manipulation. We finally agreed to split the project into two stages with the development of an automated working shell as the first part. At the moment this is finished and the second stage is in limbo (I'm not pushing). Happily the main user is now quite familiar with data entry etc in Excel which significantly reduces the need for stage two.

¹ This proved to be a false assumption given the later problems I was to have converting from Excel 4 macros to Excel 5 visual basic.

Finally, we reviewed technical questions and I tried to understand what the two different systems did (it was all news to me). We agreed the broad design, that it would show variances by fund over fixed periods such as a month/quarter etc. That it would handle non-US dollar accounts and strip out any growth/loss due to exchange rate fluctuations. Finally the system would generate reports by clients. To help design the programme I took copies of the type-written reports that they were already using⁽²⁾.

Initial Design

A copy of the original manual is attached. This will help explain some the technical aspects of this stage, but note that additional help was available in the form of comments embedded in the worksheets.

Although this design has been modified, added to, reduced etc its core elements are still how the system operates. This is particular so for the trilogy of working file, archive file and report file. The idea here was to separate data entry from data storage and from the reporting functions to minimise the danger of erroneous input overwriting a formula. An advantage in terms of design, was that the system could be identical in its essentials for both funds and bonds, allowing the user to learn quicker and reduce the amount of programming needed.

At this stage I had a number of design problems:

- how best to set the data up for extraction into individual reports;
- how to handle the need for non-US currency transactions;
- how to maintain a historical record and integrate this with the current working area;
- how to ensure that the reporting areas were neat, and balance between the clients desire to fit the main (company) report onto one sheet of A4 (at this stage, very important) with the range of analyses they wished to see.

The individual reporting (by client) proved to be fairly easy to solve. This was achieved through use of the database functions in Excel such as extract etc. The sheet was designed so that all the user needed to do manually was to enter the code of the particular client.

Equally the non-US currencies proved to be easy to handle. A separate database was created to hold exchange rate details over the last 12 months and this was combined (if appropriate) with the appropriate value in US \$. This allowed the calculation of a growth/loss that ignored the effect of exchange rates and was automated via 'lookup' and 'if' functions.

The system handled historical values in two ways. Initially the client had to enter the values, as appropriate, of all their funds and bonds over the last 12 months. Once this bulk input was done the system was configured to update this archive on a monthly basis. It extracted the current values from the working file and put them under the correct month ending date in the archive whilst the new values (externally generated and notified) were input into the working sheets. Resolving the anomalies caused by this was to be one of the major design problems throughout the project. The basic concept of holding comparative data through a linked archive was taken

² These were being produced using a pre-programmed calculator.

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from database procedures as was the idea of using unique 'key codes' for each different fund.

Finally the company reports were generated automatically. Through use of 'if' and 'is' functions it was possible to ensure that a blank cell rather than an error message was returned where the relevant data did not exist.

In addition, to these essentially data-management functions the system includes fairly complex formulae designed to estimate the yield of a bond and the annualised (ie non-compounded) rates of return on an investment. The process for handling currency transactions involved straightforward but lengthy formulae. At this stage I felt that the advantages offered by spreadsheets, in this respect, outweighed the advantages of a purely database system in terms of data-management.

One problem that was evident by this stage was that the system was too large for a single 'workbook' (ie bound collection of spreadsheets). Thus I left the input, company and client report sheets in the workbook and left the archive and currency sheets separate. This again was a problem that occurred several times.

Second Interview

During the course of completing the initial draft I had phoned several times to check technical details and to confirm what types of analysis they wished to see reported.

At this stage, I took a working draft of the system back to them. It was left and they agreed to add some real data (so far I had used false data just to check that the formulae seemed to be ok) and then I arranged to visit again in a week or so. In the interim we resolved some issues over the phone where the instructions were not clear enough or the system seemed to give out unintuitive responses.

On going back I found that the emphasis on client reporting had been dropped, and that it was more important for them to have an internal reporting function. The other major alteration was to reconsider how the system handled funds and the process of re-investing dividends or the allocation of extra stock. Although these could be handled in separate areas of the working sheet and the archive they needed to be combined into one line for the main report. This reflected the perception that they were one and the same fund. We also clarified a number of points such as how they wished the percentages to be shown and gave further consideration to the layout of the internal report sheet. At this stage their emphasis was still very much on one sheet of A4.

I also cleaned up their computer, removed a number of junk files and carried out general tuition in Windows etiquette and Excel in particular. At this stage we decided not to load Excel 5 and convert the system until I was happy that it was working as intended.

Second Draft

After checking again I deleted the client reporting function to save memory and disk space.

The process of working out how to combine the different elements of a single fund took a lot of work and reading. At this stage I was back to debating the merits of spreadsheets vis-à-vis

database systems as the combination would have been easy to carry out in, say, Access. This was notable as there was no further calculations involved, just data manipulation. Finally I extended and reordered (sometimes duplicated) the columns in the data entry sheet so they were laid out exactly as they would be needed in the final report. This enabled use to be made of the 'consolidate' routine to sum the relevant values of funds with the same codes. This was combined with a crosstab table which returned the earliest purchase date for each set of similar entries. All this was fully automated.

I then based the reporting sheet on this intermediate data set rather than on that in the working (entry) sheet as was still the case for the bonds.

Again on returning, we tidied up a number of minor anomalies and checked the system over. At the end of this session I deleted Excel 4 and loaded the client's copy of Excel 5. As this was late (midnight?) we did not check the system out as the manuals from Microsoft stressed how compatible the two versions were.

Further Alterations

From this stage to the end of the process most of the alterations were debugging and sorting out the problems caused by shifting from 4 to 5. The exceptions were the addition of a new reporting function and relaxing constraints previously set on the layout of the report sheets.

The next problem was how the 'autoexec' function I had written to set up the system and control how it saved, calculated behaved in Excel 5. In the main this still worked but it had references to files that no longer existed. This was easily resolved after a lot of hunting around for the new alternatives.

Feedback from the chief executive and the management staff in the Cayman's was favourable but there was now concern that some of the print was too small to be legible after faxing. With this in mind we re-designed the report sheet so that it was spread over 3 pages (current position, historical trends, currency effects where appropriate) for each bond and fund. This also saw some tidying up of layout, order, fonts and general formatting.

The other alteration was a report on changes from the 1st of the year to date in addition to those for the last month, quarter, year etc. In this case, rather than be based on a fixed cell in the archive (eg value 3 months ago) this would be based on a cell that would alter over the course of the year. Whilst writing this function I discovered that the system was reading the wrong archive files each time the monthly update was run. I was somewhat surprised as I thought this had been resolved some time ago. The final set of corrections was to sort this out using even more 'lookup' and database functions and checking through the system to ensure that all the appropriate references were corrected. This proved to be quite easy given the symmetry and layout of the system.

Finally to reduce the memory problem, the system was split into two explicit parts - one holding all the bonds files and the other all those connected with funds. This fitted the working pattern as the two were rarely, if ever, accessed at the same time.

Conclusions

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From the start it was obvious that the system requirement was for a factual recording and reporting system rather than the decision aiding models that are the research focus. Despite this I took on the work for two main reasons. One, was the experience of writing software not just for someone else to use but someone with whom I would not have day to day contact. Linked with this was an opportunity to extend my macro writing skills and my understanding of some of the more arcane financial functions. The second, less noble, was to earn some much needed money.

As the only real perceived benefit was technical, my working notes are more biased that way than to consideration of the social/perceptual issues. Nonetheless as should be apparent there was a significant amount of restructuring of the problem space as the project continued. I think this was due to an almost complete split in expertise. I know (knew) next to nothing about stocks and bonds so was content to use their constructs without question. The other side was that they knew almost nothing about spreadsheets.

I believe that some of the early alterations were down to failures to understand concepts used by the other. Most of the later ones were a product of their realisation of what could be offered. I do not think there was very much in this process that could be analysed from a cultural or organisational viewpoint.

I would argue that there have been two major benefits to myself. One has been the experience in software design and the amount (sometimes unwillingly) I have learnt about the fundamental constructs of Excel. The second has been an opportunity to go into an organisation and, to misquote, get out again. It is possible, though I think unlikely, that a project more in line with my research may come out of this involvement.

Roger

December 8, 1994

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Background Information

INTRODUCTION

This sheet has been set up to simplify the process of recording and updating costs for planning purposes.

I have assumed that these will remain static within a year but can be changed thereafter

Assumes four operations in use (although this will be simple to expand).

ASSUMPTIONS

Four operations are available:

Perm
Colour - Roots or Full
Cut
Dress

The operating periods are:

Oct 95 - Mar 96;
Apr 96 - Mar 97;
Apr 97 - Mar 98

Data is shown as:

Cost (excl VAT)
Price

Prices increase:

Yr 2
5% of Yr 1
Yr 3
10% of Yr 2

LAYOUT

The first section below shows the overheads (assumed) for each of the operating periods.

Then costs and prices (by stylist) by operation for each of the three years.

DATA

Overheads	from Oct 95	from Apr 96	
	To Mar 96	To Mar 97	To Mar 98
Salon			
Training etc	£20,000	£2,000	£900
2 receptionists	£6,000	£6,300	£6,930
Training School			
Staff	£0	£8,000	£8,800

Notes:

Staff costs increase as determined by percentage values in cells I8 and I10.
Training costs are set as % of assumed Gross Profits.

Direct Costs		Period			Selling Prices		
Stylist	Process	To Mar 96	To Mar 97	To Mar 98	To Mar 96	To Mar 97	To Mar 98
X	Perm	£12.50	£13.75	£14.44	£25.00	£27.50	£28.88
	Cut	£6.00	£6.60	£6.93	£15.00	£16.50	£17.33
	Dress	£6.00	£6.60	£6.93	£15.00	£16.50	£17.33
XX	Cut	£6.00	£6.60	£6.93	£15.00	£16.50	£17.33
Recruit 1	Perm	£10.50	£12.50	£13.13	£23.00	£25.00	£26.25
	Colour (Roots)	£7.50	£12.50	£13.13	£15.00	£16.50	£17.33
	Colour (Full)	£7.50	£7.50	£7.88	£20.50	£22.55	£23.68
	Cut	£3.50	£6.00	£6.30	£10.50	£15.00	£15.75
	Dress	£2.25	£6.00	£6.30	£5.75	£15.00	£15.75
Recruit 2 to July 96	Perm		£10.50			£23.00	£24.15
	Colour		£5.00			£14.00	£14.70
	Cut		£3.50			£10.50	£11.03
	Dress		£2.25			£5.75	£6.04
Recruit 2 from July 96	Perm		£12.50	£13.13		£25.00	£26.25
	Colour		£7.50	£7.88		£20.50	£21.53
	Cut		£6.00	£6.30		£15.00	£15.75
	Dress		£6.00	£6.30		£15.00	£15.75
XXX	Perm	£10.50	£11.55	£12.13	£23.00	£25.30	£26.57
	Cut	£3.50	£3.85	£4.04	£10.50	£11.55	£12.13
	Dress	£2.25	£2.48	£2.60	£5.75	£6.33	£6.64
XXXX	Perm	£10.50	£11.55	£12.13	£23.00	£25.30	£26.57
	Colour (Roots)	£5.00	£5.50	£5.78	£14.00	£15.40	£16.17
	Colour (Full)	£5.00	£5.50	£5.78	£19.00	£20.90	£21.95
	Cut	£3.50	£3.85	£4.04	£10.50	£11.55	£12.13
	Dress	£2.25	£2.48	£2.60	£5.75	£6.33	£6.64

XXXXXX	Perm to Jan 96	£3.50			£8.00				
	Perm post Jan 96	£10.00	£11.00	£11.55	£12.50	£13.75	£14.44		
	Colour	£5.50	£6.05	£6.35	£6.25	£6.88	£7.22		
	Cut to Jan 96	£1.50			£2.75				
	Cut post Jan 96	£1.50	£1.65	£1.73	£5.00	£5.50	£5.78		
	Dress	£0.75	£0.83	£0.87	£3.00	£3.30	£3.47		
XXXXXXXX	Perm to Jan 96	£3.50			£8.00				
	Perm post Jan 96	£10.00	£11.00	£11.55	£12.50	£13.75	£14.44		
	Colour	£5.50	£6.05	£6.35	£6.25	£6.88	£7.22		
	Cut to Jan 96	£1.50			£2.75				
	Cut post Jan 96	£1.50	£1.65	£1.73	£5.00	£5.50	£5.78		
	Dress	£0.75	£0.83	£0.87	£3.00	£3.30	£3.47		
XXXXXXXX	Perm to Jan 96	£3.50			£8.00				
	Perm post Jan 96	£10.00	£11.00	£11.55	£12.50	£13.75	£14.44		
	Colour	£5.50	£6.05	£6.35	£6.25	£6.88	£7.22		
	Cut to Jan 96	£1.50			£2.75				
	Cut post Jan 96	£1.50	£1.65	£1.73	£5.00	£5.50	£5.78		
	Dress	£0.75	£0.83	£0.87	£3.00	£3.30	£3.47		

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In your financial analysis

INTRODUCTION

This sheet forms the basis of estimating revenue flows etc.

It is very important to ensure that the respective rows (stylist/operation) exactly match those on the costs sheet.

With this in mind all that need be entered here is the number of estimated 'processes' (by category) for the period in question.

ASSUMPTIONS

Only one major assumption has been made. I have allocated the overheads between stylists pro-rata to the number of operations that they carry out. Since the overheads are mainly receptionists this seems a reasonable method of allocating their work (ie in relation to the number of clients).

This is very easy to alter if so wished.

DATA

Do Not Overwrite cells marked as:

these are automatically calculated

For the period to March 96

Stylist	Process	Units	Total Cost	Total Income	Gross Profit Margin	Overheads	Other Costs	Total Costs	Net Profits
X	Perm	143	£1,788	£3,575	£1,788	£575	£1,000	£3,363	£212
	Cut	600	£3,600	£9,000	£5,400	£2,414		£6,014	£2,986
	Dress	44	£264	£660	£396	£177		£441	£219
XX	Cut	600	£3,600	£9,000	£5,400	£2,414	£1,000	£7,014	£1,986
Recruit 1	Perm	57	£599	£1,311	£713	£229	£1,000	£1,828	£517
	Colour (Roots)	300	£2,250	£4,500	£2,250	£1,207		£3,457	£1,043
	Colour (Full)	63	£473	£1,292	£819	£254		£726	£565
	Cut	300	£1,050	£3,150	£2,100	£1,207		£2,257	£893
	Dress	25	£56	£144	£88	£101		£157	£13
Recruit 2 to July 96	Perm		£0	£0	£0	£0		£0	£0
	Colour		£0	£0	£0	£0		£0	£0
	Cut		£0	£0	£0	£0		£0	£0
	Dress		£0	£0	£0	£0		£0	£0
Recruit 2 from July 96	Perm		£0	£0	£0	£0		£0	£0
	Colour		£0	£0	£0	£0		£0	£0
	Cut		£0	£0	£0	£0		£0	£0
	Dress		£0	£0	£0	£0		£0	£0
XXX	Perm	48	£504	£1,104	£600	£193	£1,000	£1,697	£593
	Cut	900	£3,150	£9,450	£6,300	£3,622		£6,772	£2,678
	Dress	120	£270	£690	£420	£483		£753	£63
XXXX	Perm	115	£1,208	£2,645	£1,438	£463	£1,000	£2,670	£25
	Colour (Roots)	285	£1,425	£3,990	£2,565	£1,147		£2,572	£1,418
	Colour (Full)	100	£500	£1,900	£1,400	£402		£902	£998
	Cut	600	£2,100	£6,300	£4,200	£2,414		£4,514	£1,786
	Dress	70	£158	£403	£245	£282		£439	£37
XXXXXX	Perm to Jan 96	14	£49	£112	£63	£56	£1,000	£1,105	£993
	Perm post Jan 96	42	£420	£525	£105	£169		£589	£64
	Colour	56	£308	£350	£42	£225		£533	£183
	Cut to Jan 96	115	£173	£316	£144	£463		£635	£319
	Cut post Jan 96	350	£525	£1,750	£1,225	£1,408		£1,933	£183
	Dress	120	£90	£360	£270	£483		£573	£213
XXXXXXX	Perm to Jan 96	14	£49	£112	£63	£56	£1,000	£1,105	£993
	Perm post Jan 96	42	£420	£525	£105	£169		£589	£64
	Colour	56	£308	£350	£42	£225		£533	£183

	Cut to Jan 96	115	£173	£316	£144	£463		£635	-£319
	Cut post Jan 96	350	£525	£1,750	£1,225	£1,408		£1,933	-£183
	Dress	120	£90	£360	£270	£483		£573	-£213
XXXXXXXX	Perm to Jan 96	14	£49	£112	£63	£56	£1,000	£1,105	-£993
	Perm post Jan 96	42	£420	£525	£105	£169		£589	-£64
	Colour	56	£308	£350	£42	£225		£533	-£183
	Cut to Jan 96	115	£173	£316	£144	£463		£635	-£319
	Cut post Jan 96	350	£525	£1,750	£1,225	£1,408		£1,933	-£183
	Dress	120	£90	£360	£270	£483		£573	-£213
	Totals	6461	£27,686	£69,353	£41,666	£26,000	£8,000	£61,686	£7,666

Database Instructions

Introduction

A bit of general technical stuff, then the nuts and bolts. Some of this may seem more complex than it really is. Worth noting that Access has a very nice help function.

The system is written using Microsoft Access v II. This is a relational database.

What does that mean you cry? It means that you can enter data at multiple points and it will file it at a single central point. It also makes it easy to view the data from different perspectives. Simply this makes it nice for the user. As it is a window package it also shares that functionality and ease (relative) of data transfer to other packages such as spreadsheets or word-processing documents.

A database is a better way of manipulating chunks of information rather than of doing sums (when you're better off with a spreadsheet). They are also easier to write an environment where the user needs no knowledge of the underlying processes (unlike spreadsheets). However, they are very stupid. It is absolutely essential that people entering names, dates etc are careful not to make silly errors. For example, it will not recognise Smith and Smith as the same person.

Access has a few working conventions I'll quickly outline, then on to the details!

There are six elements - Tables, Queries, Forms, Reports, Macros and Modules. The last two are programming bits so I've ignored them below. I'll go through the others one at a time but in practical terms this system has been written so you do not need to consider the first two.

Tables

These are the core of the system. All data must be held in at least one table. It is a good idea to think about these carefully before starting as their structure will constrain the whole database. In this case for example I have held permanent details of your clients (address, name) in one, whilst the ephemeral stuff (last haircut) is in another. Two disadvantages, they are not user-friendly for entering data and they hold data in the order it was entered. This makes it hard to sort/extract by date, alpha order etc.

To overcome this and allow different views on the data are:

Queries

A query can be based on one or more tables. It can take only part of the data from the table if this is desired, can be sorted in any way convenient. Best it can combine data from different tables. Want to know how many clients X saw? Write a query that combines the staff details with the client details. Want to know the distribution of your clients by post-code, age; write a query.

Want to export data to a spreadsheet or word-processing file, often best to use a query (especially for the former).

Great stuff, still not v friendly for input purposes and the print outs don't look that great either.

So

Forms

These can be based on either tables or queries (usually the latter). Can be configured to help input, with pre-set data types (you can't put a name in a field expecting a date for example), and pull up menus. Forgotten a client code, use this to check. Most systems (& of course this one) use these as the heart of the user input system.

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But it ain't all data input, you want to know who's going to have a birthday, next appointment etc. Could print out a query (but remember not very attractive), so we have

Reports

Really exactly what it says. This is the core of your printing system.

BASIC STRUCTURE

All these elements are part of .mdb (mdb just means its an access database). The tables are:

Tables in .mdb	
Title	Contents
Age Groups	Lists the age bands customers are allocated to, helps avoid erroneous entries
Customers	One of the key tables, basically hold general background data on each of your customers
Hair Details	Another key to the system, regard this as a customer order, ie complete a new line for each appointment, it contains details of treatment, cost, operator and the date of the next appointment
Staff	Lists the staff, at the moment this is pretty sparse but could expand to hold NI number, address, career details etc etc

These tables are related in various ways. The most important is that for any given client there should only be one entry in 'customers' but you can have as many 'hair details' entries as you like. Think of it as customers placing orders. The reporting system will allow you to filter out those you do not wish to consider.

As I've already indicated these are not the most friendly of environments to work within (though there's no reason why you can't).

These tables are combined and analysed through a number of queries, these are:

Queries in .mdb	
Title	Contents
Cancel Appointments	Allows you to cancel an existing appointment
Customer appointments by selected periods	This allows you to identify which customers have appointments after a given date. Eg next month, tomorrow, whatever period you need, at the prompt just type the first date of the relevant period.
Customers (all)	This is the customers table but sorted into alphabetical order.
Customers by DOB (Specific)	It is used to generate the monthly birthdays report. Say you wish to know which clients have birthdays in April, run this query and type 'April'
Customers by starsign and Date of Birth	This a subset of 'customers' showing starsign, dob, age group and name.
Customers, visits and income	A more complex query, it draws data from 'customers', 'hair details' and 'staff' to list all the visits a customer has made, how much they paid and who dealt with them.
Customers without appointments	Generates a list of clients who do not have a new appointment date.
Postcode and agegroup (crosstab)	This is an indication of the sort of question you can ask the database, the age spread of your customers by geographical area.
Postcode and starsign (crosstab)	As above, somewhat frivolous.

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Staff and operations	Again somewhat complex in that it draws together multiple data. What it gives you is for each member of staff how many people they've seen (dates) and how much you earn (cost). Its similar to 'customers, visits and income' but from a different perspective.
Staff and operations (selected periods)	Use this query to see how many people etc each member of staff has seen in a given period. At the prompt enter the first date of the period you are interested in (eg 1/1/96)
Staff, work and income (crosstab)	Simplification of 'staff and operations', on a given day how much in total has a given member of staff brought in.

As I've already indicated this, again, is not a great way to enter data (although in most cases you can). These queries have been written to form the basis of forms, reports or to export data to other applications. Note that these are essential if you are to write a report.

Forms in .mdb	
Title	Contents
Autoexec	This simplifies the whole operating environment so your staff won't need to worry about all the above. It acts as the user-front end to the whole system. It is described in more detail in the appendices.
Customers (Personal Details)	This in effect mirrors the customers table. It should be used to set up or alter the basic personal details of each of your customers. Note that in some cases the entry is constrained by the use of pull up menus. This means for example they can't select a stylist who is not entered in the staff list.
MIS	This allows access to more reports and features than those within 'Autoexec'.
Operations and visits	Think of this as a customer order form. Complete for each visit, it also allows you to enter the date of the next appointment.
Staff	Allows you to enter the names, details of members of staff.

These are described in more detail in the appendix. I've written one page for each form.

Reports in .mdb	
Title	Contents
Customer appointments by selected periods	This allows you to identify which customers have appointments after a given date. Eg next month, tomorrow, whatever period you need, at the prompt just type the first date of the relevant period.
Customers (Personal Details)	Prints out, one per page, the basic personal details of each of your customers, useful if you need paper records. You can print the whole thing or just selected pages.
Customers and appointment details	This report combines data on the treatment a client has received in the past with some of their personal details. It is in two variants, one allows you to list/print all your customers and all their visits. The other allows you to select an individual client.
Customers by DOB (Specific)	It is used to generate the monthly birthdays report. Say you wish to know which clients have birthdays in April, run this and type 'April' when prompted.
Customers without appointments	This allows you to identify customers who have been seen at any time in the past but who do not have an appointment for a future visit.
Staff and Operations	Lists (by staff) all their dealings with clients and sums the total income. Variants of this report allow to cover the last month/quarter/year
Staff and operations	Use this report to see how many people etc each member of staff has seen in

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(selected periods)	a given period. At the prompt enter the first date of the period you are interested in (eg 1/1/96)
Summary Report (Clients by postcode)	Based on the query combining Postcodes and age, gives you a print out showing the number of your clients broken out by age and postal districts

OPERATING CONVENTIONS

The following steps should be kept to.

- Always create a record for a new client before setting up an appointment/visit record.
- You can enter dates in any recognisable format eg 25/5/96, 25 May 1996, it will display these as pre-instructed, or complain!
- all actions are rooted through the autoexec form although there are other links in operation. Essentially you will start and finish here.
- if you need to look at or modify the tables/queries, from 'window' select 'Database: ...', this will then take you outside the controlled operating environment. You can always re-enter it by repeating this process and selecting 'Form: Autoexec'.
- saving is pretty easy, it is in fact automatic, enter a field, move to the next and the first is now saved! This is good, but it is dangerously easy to overwrite, hence the need to keep backups.

ELEMENTARY OPERATING PROCESSES

Access is a windows application. This means that an awful lot of the operating processes are standard, double click (with the mouse) or press RETURN to open a file for example. Scroll bars to help you move around a file etc etc.

Forms

Most of the time this is where you will be working. Each form consists of four basic parts:

- a side bar down the left hand side. If you want to delete an entire record (see next point), click on this and press delete. Otherwise you can ignore this.
- at the bottom of the screen you will see an area with buttons like |< < > >|. In the middle of this lot is the legend 'Record # of #'. Each page (they are shown as all on one line in the relevant table) constitutes a record which has a collection of 'fields' (see next point). You move between records by making use of this section. The symbol |< will always return you to record 1, whilst >| takes you to the final record. < or > allow you to advance or go back by one record. Finally you can type the record number (say 10) that you wish to go to.
- most of the screen is taken up with boxes that contain data or where you can enter new stuff. Each of these is a 'field' and these are described in detail for each form in the appendix. You can move between fields either by using the mouse or by pressing the tab key. The latter is useful if you are busily entering data. I tend to use the mouse when I'm checking something or modifying data.
- there are various raised 'buttons', click on these and you will be transported to another form of your choice.

To create a new 'record' go to the final existing record and then click on the advance one record arrow, this will give you a blank form that you can enter the data into. You can also do this by selecting 'records' 'go to' 'new' from the pull down menus.

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It is quite likely that you will in fact want to find a particular 'record'. To do this, first position the cursor in the 'field' you wish to search by (surname, address whatever) then click on the button at the top with the binoculars, then type the name whatever you wish. Remember spelling mistakes (including incorrect capitalisation) will prevent this from working. This can also be done from 'edit' 'find' on the pull down menus.

Reports

Much simpler, you can't edit the data here, nor can you search for specific records. It does, however, still allow a bit of flexibility for you.

When you first open a report you will usually only be able to see part of the page. Click with the magnifying glass and the whole page becomes visible, click again and it will only show you a part. This is useful as the full page preview is too large to allow you to read the entries.

At the bottom of the page you have the same facility to move around as described for forms above, this is useful if you maybe only want to print a few pages showing specific data. In most cases you will find just a single 'record' to one page.

If you decide you do not wish to print, close the report (from file) and you will be returned to the form that you started from.

To print either click on the printer icon, or 'file' 'print'. This gives you the option of printing everything, or of specific pages. You can also alter the print setup. After printing close the report as above.

R Cook
28.5.96

1-B-10

Appendix 1: Autoexec & MIS

Print outs showing the layout of these forms are attached.

Autoexec is the core to the operating system. It appears when you enter the database and you can access all parts of the system from it. Having said this it is pretty simple. Just click on the button and you will be taken to the relevant form or report.

The text I've entered should help clarify which button does what. The text refers to the button below it.

In the lower left hand corner there are two options. 'Exit Database' will close down the whole database. 'Open Further Reports' will give you access to another screen that lists reports I couldn't fit on here. They are also reports that you might wish to restrict access to. Note that at the moment there is no security within the system. You might like to give some thought to this.

From 'open further reports' you enter MIS. At the moment this is just reports. If you wish to expand the staff data I suggest that we do that through a new form and put that here. Basically what I'm suggesting is that this sheet be kept away from general use.

Last point, the Data Protection Act might apply. At the very least you will need to ensure that this data is correct and checked with your customers. Might be worth checking in some detail though.

1-B-11

Appendix 2: Customer Record

Attached to this is a print out of the actual form and of the basic report that is based on it.

I'll describe the form from left to right and downwards:

Title	Purpose	Special Considerations
Back to Main Menu	Press this button, will return you to autoexec.	
Customer ID	Identifies each customer uniquely within the system. Very important.	This <u>must</u> be unique for each client. I have formed it by taking the initials of the first name and last name followed by a number. When entering, say Roger Cook, try RC1, if you already have a RC1 it will complain, alter to RC2 etc.
First Name		
Last Name	In most cases v obvious, note that for some clients the first name isn't on the sheet so I've entered Mrs Smith or whatever here, if you can I'd correct these.	
Date of Birth	To enable the 'birthdays' report to function.	Note the layout, Month: Day. v important that it is always entered in this format.
Starsign		
Address		
City		
Postal Code	main area identifier	doing this will help to analyse the database by geographic location which is hard to do off the full postcode.
Postal Code (full)		
Phone Number (home)		
Phone Number (work)		
Year of first custom		Seemed to be the easiest way to identify when a customer started using the salon.
Stylist		Note that this is a controlled menu, an entry much match the stylist list from the pull up list.
Age Group		again controlled to the options on the list.
Preferred Refreshments		
Social Life		
Set up or modify appointments	a button that allows you to book a client into an appointment etc	
Likes		
Dislikes		
Edit/Create a staff record	Allows you to add or modify the details of a member of staff.	

1-B-12

Appendix 3: Visit Record (Hair Details)

Attached to this is a print out of the actual form and of the basic report that is based on it.

I'll describe the form from left to right and downwards:

Title	Purpose	Special Considerations
Back to Main Menu	Press this button, will return you to autoexec.	
Date of visit		enter this in a form such as 3 Apr 96, 3/4/96 or 3 Apr 1996, it will always be displayed as a full date.
Customer id	Relates appointment to client. <u>Very important.</u>	Must be correct, otherwise this record will not relate to the correct client. You can use the 'Customers Cross-Check' (below) to check.
Customer surname	Matters but less crucial.	As above
Hair Type		
Hair Length		
Condition		
Operator 1	Enter from pull up list	
Operator 2		
Cost		
Products		At the moment this is a free-form memo field. ie you can put anything in there you wish. Given the various entries on the form this is the best that could be done for now but may be worth addressing in the future.
Developments		
Update/Enter Customer Details	Takes you to the customers form. use to enter a new client.	
Target Colour		
Target Curl		
Customers Cross Check	Allows you to check correct id and surname	Scroll down this to double check that you've used correct id/surname details.
Rod Size T		
Rod Size B		
Rod Size S		
Rod Size N		
Edit/Create Staff Record	Takes you to the staff form	
Remarks		
Next Visit	Used to generate the appointments report	

Note, that if you are to derive benefits from this beyond a customer management system, there will need to be a more systematic approach to what goes into certain boxes than is evident on the sheets supplied. For example, in some cases the Colour field contained what I guess to be 'Products' info. If all that is required is an electronic/paper record fine.

It would, however, be perfectly feasible to radically expand this. List out the hair treatments, different products etc and calculate both the costs and target prices.

Data Entry Options

Edit or Create a customer record

Enter appointment details

Edit/Create Staff Record

At the prompt enter the date of the appointment, it will list all the appointments for that day, delete the date for the relevant client.

Cancel existing appointment

Report Options

This report allows you to print some or all of the customer records

Report (Customers, Personal Details)

This report allows you to print a report that lists all the customers who have birthdays in a given month. At the prompt, type the name (eg Feb, June) of the month you are interested in.

Report (Customer Birthdays)

The next two reports allow you to print out the details of customer visits to the Salon. The first will display everyone, the second all the visits and treatments for a particular client.

Report (Customers and visits: all clients)

At the prompt, enter the desired customer

Report (Customers and visits: select individuals)

This allows you to identify which customers do not have a current appointment

Report (Customers without next appointment)

This report prints out the details of customers who have appointments in a given period, at the prompt type the first date (day/month/year) of the period you need to check.

Report (Customer Appointments)

Other Options

Exit Database

Open Further Reports Form*

1-13-13

Back to Main Menu

Date of Visit

31 January 1996

Customer id

AB2

Customer surname

Hair: Type:

Hair: Length

Condition

Operator1

Operator2

Cost:

£25.00

Update/Enter Customer Details

Products:

Development:

13 mins

Target: Colour

Target: Curl

Customers: Cross-Check

AB1
AB2
AC1
AC2
AC3
AG1

Rod Size: T:

Rod Size: B:

Rod Size: S:

Rod Size: N:

Edit/Create Staff Record

Remarks:

Next Visit

06 March 1996

1-B-14

Customer ID: ts1

First Name: Teddy

Last Name: Sheringham

Date of Birth: Jan 94

Starsign: Capricorn

Address:

Postal Code:

City: Barnsley

Postal Code (full):

Phone Number (Home):

Phone Number (work):

Year of first custom: 1994

Stylist:

Age Group: 4165

Preferred Refreshments:

Social Life:

Work Details:

Set up or modify appointments

Likes:

Dislikes:

Edit/Create Staff Record

1-8-15

1-B-18

Report on Company B

Introduction

This study involved a small service company based in South Yorkshire. This was undertaken as part of a wider consultancy which was seeking to place the company's internal structures on a sounder footing to allow further expansion. This project had uncovered particular weaknesses in the quality of financial information and in record keeping in respect of customers. The initial recommendation was for greater use of IT and, again, the company lacked the in-house expertise to design the necessary systems, although it had some experience of using IT to record data.

This organisation was small. It was owned and run by three members of a family (parents and one of the sons). There were around a dozen other employees and a number of trainees.

Methodology

These cases are also examples of action-research. In both the researcher was closely involved with the companies as software designer. In this, if nothing else the technique is almost the geometric opposite of positivistic research philosophies where the "researcher must maintain complete independence if there is to be any validity in the results produced" (Easterby-Smith et al, 1991, pg. 33).

Such an approach can simplify the difficulties of obtaining access to organisations but there are significant difficulties that come from using an action research paradigm. Before discussing this it is worthwhile to stress that it was not a conscious choice in either case. In this case the aim was to design the software within the framework of the wider consultancy and then negotiate research access. In the event this proved impractical leaving just the action research phase.

One major difficulty with action research is that it leaves the researcher very vulnerable to what Easterby-Smith et al (1993) describe as "conflicts that may be far deeper and more complex than will be evident to a relative newcomer in an organisation" (pg. 64). A good example of this is the loss of research access in company B which came about as a result of a shift in the balance of strength between the son (who wanted change and was prepared to support the research) and the parents (who had had quite enough of both change and outsiders).

This style of research also involves ethical questions (Bryman, 1989). Merely combining the roles of co-problem solver and recording data for research use could be said to involve a degree of deception.

Findings

The organisations had identified that they had a problem before involving myself and improving their financial performance was critical both for short term survival and longer term growth. This problem was identified by an external consultancy funded by the local TEC.

The initial problem formulation was undertaken by the consultant involved and consisted of a brief agreed jointly with the client. This was for two separate software systems. The first was to be a simple spreadsheet system that would enable them to gain greater control over their costs and cash-flow problems. This was modelled on a paper system already in use. The second was for a database system that would improve their tracking of clients and give better control over appointments and usage of staff time. It was also agreed that appropriate training would be provided.

However, the extent of the crisis in Company B was disputed by at least one of the parents and, as a result, was the need for any external intervention. The software was structured using representations familiar to the clients. In both cases, solving the problem led to new insights as to the overall problem domain and implementing the decision aid generated fresh dimensions and demands.

Two systems were designed for this company. The first was a spreadsheet to help them understand their financial position and the second a database to improve their client management. This was a family run firm and the main contact both for information and for validation was the son. This individual had embraced the overall strategy proposed by the consultant but it was clear that neither of the parents had the same commitment or enthusiasm either for an IT solution or the overall process. Thus at the very least there were disagreements as to the strategic image (Beach, 1990) in the sense of how they should tackle the problem, but also on the more fundamental level of the value image (ie was there a problem).

The spreadsheet was again designed to mimic a manual worksheet already in use. It was deliberately kept simple but did allow the development of analyses based on the profitability of different products and staff. Implementation of this system also revealed that the existing office manager felt threatened by such an approach and this individual proved resistant adapting to any external solution.

The database also automated manual systems already in use. It was brought into use some nine months after the spreadsheet and a deliberate choice was to remove it from the control of the office manager. It was demonstrated to the son who suggested a number of modifications. All processes in this system were menu driven with controlled data input and access to the core code restricted. This allowed the database to be operated by someone with only limited IT skills.

The system was then left with the company for them to load client records and to start using on a day to day basis.

However, this shift from deriving a problem solution to its implementation was more complex. Especially as the transition opened up the debate from consultant and immediate internal contact to the wider organisation. Here the differing images played an important part.

When the spreadsheet system was implemented the company was facing severe financial difficulties and the son was threatening to leave and work with his brother. The system, and other changes promoted by the consultant, produced relatively quick results which could be seen in direct financial terms (a particularly important dimension to the father). Thus a combination of financial and personal pressure meant that the aid was allowed time to prove its worth.

By the time the database was written and implemented the immediate financial problem had been resolved. Even though elements had been deliberately written into the system to appeal to the parents, it was apparent they had reverted to their initial view that such an approach was unnecessary (although the spreadsheet continued to be used and accepted). When it was checked some two months after installation it was found that no more data had been added except that imported when setting up the initial system. In this case the son had, if anything, been even more enthusiastic about the system but here it had not been adopted within the company. It is also worth noting that its implementation coincided with the end of the active phase of the main consultancy.

Conclusions

The company lacked the in-house expertise to implement an IT solution themselves the designer of the decision aid was able to work closely and co-operatively with one member of the organisation. The difficulties resulted from how much that person's enthusiasm's were shared elsewhere in the company. The dynamics can be sketched out as:

- the problem was not so well recognised by all responsible for running the company and it had taken an impending threat (the son's resignation) and the arrival of an external consultant to bring even grudging acceptance of an IT solution;
- both aids addressed improving information processing capacity;
- the organisation lacked a shared strategic image for the particular problem and may have lacked a shared value image as well.

The route through the problem space could be characterised as the shared understanding of three experts, with the son supplying the domain specific data, the other consultant setting a wider agenda and myself supplying the IT aptitude. The first aid made the transition from design to implementation and wider acceptance, the second failed.

In the first case there were differences in images within the company but external factors were different. First, though not enthusiastic for an IT solution, the financial nature of the outputs made them easily acceptable to the father. Second, it had become clear that the company was facing bankruptcy unless internal financial controls improved. This threat was compounded by the intention of the son to resign. Thus the images were not diametrically opposed and there were very powerful external forces pushing for a revision of the company's processes.

In the second case the same disputed images existed but without the situational factors that had earlier overridden the objections. The company's short-term financial situation had improved as a result of a general revision of work practices as well as improved monetary control. This left the son, as internal supporter, in a weakened position, although he was still committed to this approach and determined to bring about further internal change. However, the other pressures were less powerful.

1-C-1

Northampton Square
London EC1V 0HB

Telephone: 0171-477 8000
Direct Line: 0171-477 8502
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*eg of covering letter
sent to all interviewees*

10 August, 1995

Dear

Please find enclosed a copy of my notes of our conversation the other week. I feel I must apologise for the delay in responding and can only claim pressure of other tasks and a short bout of illness.

The notes are very much in 'note-form'. To a very limited extent I have tidied them up in terms of headings and regrouping certain topics. Otherwise they are a straight copy of what I wrote down at the time. I would be very grateful if you could read through them and correct any inaccuracies (equally, correct any ambiguities).

If I could impose on your time and good will to an even greater extent I would be even (more!) grateful if you could jot down some thoughts as to how you could see IT being used to assist in the sort of decision processes we discussed.

Can I also take this opportunity to thank you again for your time and the freedom with which you discussed various issues. I will not be showing the raw notes to anyone else and any analysis will be structured so as to ensure anonymity for the individuals involved.

I have already agreed with [redacted] that the final (published) draft will not mention the college by name, although I will acknowledge its substantial help in the acknowledgements page. I have promised [redacted] sight of the first reasonable draft and will send one to yourself as well.

Again, thanks for your help.

Roger Cook

1-C-2

Ci - interview notes

(Head of Caring)

5 programme areas within caring, funding against fixed costs?
budget decided on basis of previous year ~~not on~~ FTEs
now move to unitised system which reflects funding
methodology (aim) is to size programmes to these allocations

student funding mechanism of 10% entry, 80% (3 stages) being taught, 10% exit

if programme is over 9 hours then funded - also count guided ^{learning} training hours?
programmes put into hour bands

set own targets ^{eg enrolment} against each category - control

no of teaching units 80% ie 800,000 from 1m, the balance generated by work based learning -
composed of franchising to national industry, validation (NVQ), quality assurance

DE concern - contracts, not always wise/not FE - need to demonstrate 'adding value' to WBL

competition

future planning, virtual monopoly post-16 in Barnsley except Penistone Grammar and other
peripheral schools (eg Rockingham, Wath), implication of white paper that any organisation or
training provider could support 6th form. Possibly with LEA blessing as part of inward
investment package.

role of TEC funding, to head off decided to move towards own NVQ assessment centre for
core awards - a consortium took on personnel, now funded via FE as are now colleges own
students.

student records

fragmented - enrolment, leaving, achievement, draw summative information from end of year
records, also examination records. Greater detail at programme area such as placement,
feedback from tutor and progression. Held by course co-ordinators.

Record checks attached to programme areas - forms control process, tried computerised
system using swipe cards abandoned due to variety of technology problems - bar codes,
speed, pens misfunctioned, poor feedback systems. System was originated and set up by MIS
dept.

target setting

each section reviews planned portfolio using data such as CALMI, trends etc then projects
any carried forward student numbers, these numbers are then converted to units via the
learning hours. Funding is on per unit basis.

1-C-3

Ci

Free choice as to pattern of units and in general recruitment is easier via FT students but this is constrained by what relevant market wants. Thus pre-school learning association & community based training want short 12/20 hr units. If delivered locally then need for development worker to set up and deliver programmes.

¹⁶⁻¹⁹ - 5:2
local age participation 40%, competition from local training agencies offering grants etc.

to secure numbers investment in:

links with schools, link tutors from Yr 11 in individual schools, links with changes in pre-16 curriculum, yr 9 onwards - taster programmes (2 vocational areas).

HE

implications for college culture,

HND market mostly local, Access market is potentially large given local tradition of leaving formal education at 16, so v interested in boosting HE role;

emphasis on pastoral support, community, access, student access to tutors

just finished yr 2 of degree plan, now to start yr 3 - poss shortage of expertise
already have validated (Univ of Sheffield) degrees in Health and Social Sciences.
bring in 5 MPhil students (15 over whole college) from Univ of Sheff via Barnsley
scholarships, will work at B for 2 days pw to supervise research projects.

HE mixing well with FE, role of college in community, now offer degree from certificate level, using CATS so entry with advanced standing etc, also both PT and FT study.

Using UCAS to attract wider applicants,

sports facilities - HE level, post -18 facilities in separate premises, social heart of college, expect that infrastructure etc will lead to closer FE/HE integration

some staff pure FE, others mix of teaching, students mixed learning basis (esp PT eve), note pressure on staff from writing/delivering programmes also demands (quality) of FE funding council.

FEFC not allow cross-subsidy FE→HE, care to tie salary sources to teaching loads

some new staff solely for HE, prepared to support funding to MPhil, some teaching remission through portion of load set as tutorial rather than lecturing hours.

^{making a plan}
collective choice some two years ago to move to HE

Ci
response to follow-up letter

1-C-4

BARNESLEY
College

3/9/95

Dear Roy,
Many thanks for notes - enclosed.

Thoughts on I.T. -

- 1) recording at section / dept level operation of units against budget of funded units
- 2) local database on council accounts - esp 16-19 - distinctions at 16 + 19 in terms of school, geography, gender etc.
- 3) close link between above + student recording / tracking - having a I.T. data file for each student progressing through institution.

Best wishes with your project.

Neil Brown

1-C-5

Cii

Interview Notes

- Assistant Programme Leader (Business Studies)

given brief to develop HE provision and quality assurance work. Now this has settled down move to review core post 16 work.

HE

growth has been capped by MASN, originally only allowed intakes of 16 for BA Bus Mgt (Sept 94), now 25, validated via Sheff Univ.

initial cohort was biased to mature students who struggled in first semester but were ok in 2nd, 2/16 failed for academic reasons.

historic provision has been HNC/D and BA Bus Adm (Franchise from Leeds Met), want to enhance local access and provision. Develop o/seas links with Turkey and a Business School in Copenhagen.

Planning

reviewing the causes of growth on particular courses.

GNVQ business at level III very much concentrated at the college. 4 strands of ALevel/GCSE provision - econs, bus stud, law and accounts. Last two historically small areas of take up (esp A Lvl). Bus St is very popular and seems to have grown at the expense of econs.

remarket the courses - review syllabus/teaching, may decide to accept decline and phase out if needed.

aiming to develop continuity 16-21 via degree provision.

GCSE accounts (day & evening) successful, hope this will start to feed through to A Level, law small at all levels. Feel the interest is there but hasn't been pushed recently due to commitment of time to HE, NVQ and professional courses. Funding methodology favours A Levels (?) due to weight given to units of activity.

decision making processes

I'm not sure if this is a 3 level system
would attract in aggregate considerable units of activity

meet with team leaders for A Levels and GNVQs for brainstorming sessions. Generate ideas to maximise funding and numbers at each point of pre-entry, entry, study and exit. Look at each phase individually. Then set action pts from this process. Use of who, what, when, where paradigm.

note no cap on Post-16 numbers, market is potentially competitive but locally the college has a monopoly except for some peripheral schools such as Penistone.

planning process conducted via meetings and specific days. This involved presentations to course team on performance and historical perspective. Data analysis, tools such as SWOT and then id areas for development. Closely tied to development

? from specific

of action plans.

accuracy of raw info seem as vip.

meetings involve pre-circulated papers and agreement on overall strategy and development of college image. Have set critical success factors and id what is needed to achieve them -

infrastructure, finance (& independence), targets to specific areas through use of consumable budget, links with feeder schools

trying to id what is actually involved in growth, seeking to expand range of provision also long term trends in recruitment. How reliable is data - need to defend to outside bodies. Better to grow in core? or as add-ons (trad approach). Costs to growth but feeling that to stay static is unfeasible (spill over into decline). Need to constrain growth to staff constraints. Interaction of growth and quality.

planning for optimal groups to allow best provision to students to be balanced with financial needs and burden on staff.

Aims

seeking to complete matrix of areas provided and levels, carry out resource audit and of current staffing position. Looking to boost IT input into courses and maximise links with pre-16 feeder schools.

facing statistical demands that force a level of disaggregation for the raw data. Look at overall pass rates, grades etc then break down to analyse performance (esp exit). Trying to measure 'value added' by also looking back at entry grades.

GNVQ

feel that there is too high a burden of assessment with the various phase tests linked to the individual modules. reviewing this.

strong team of staff but recent growth has led to people being spread over too much with poss neglect of the core activities. Recreate discrete teams and develop a culture around the basics of the course, qual assurance and syllabus development.

student support has meant giving a number of basic texts linked to study of particular modules also access to learning centre, IT and the library.

less of a difference now between GNVQ and A Level students, level of assessment has improved discipline and seems to have attracted more academically able students. Students are allowed to chose between ALv/GNVQ, assisted by induction opportunities to sample courses over the summer.

feel that GNVQ good basis for HE, grades are good with nos of Distinctions and Merits.

Planning Days

clarify roles, seek to bridge gap between deciding on a strategy and implementing it.
very much action planning process

more 'what is' than 'what if'

priority setting

inspection - staff development/monitoring, trying to get good standard rooms & make all aware.

seek to expand - provision of mgt training, staff development so can complete
provision matrix, plan up to 1997, seek to maximise units of activity, growth of 25%

need more info to assist this process but problems with the registry and the quality of
data, need more disaggregation so can check and thus gain confidence in its accuracy.

1-C-8

B·A·R·N·S·L·E·Y
College

Our Ref: MJG/JH/RLB.10.cor.7

21st August 1995

Cii
response to follow-up letter

Roger Cook
City University
School of Social Sciences
Northampton Square
London
EC1V OHB

Dear Roger

Thank you for your letter and attached notes of our meeting.

I think your notes are an accurate and certainly a very full record of our meeting. I have made one or two comments of a minor nature to clarify.

With regard to IT as an aid to decision-making, I certainly think this is important and an essential means of reducing paperwork and speeding communication. As part of a 'Virtual College' project, we have now been fully integrated with the college fibre optic network, and, although in an embryonic phase, we expect significant improvements to the communication both within the Section and between the Section and outside elements.

Yours sincerely

Assistant Programme Leader
Business and Management Studies

HC-9

iii Ciii
Interview Notes

Head of Humanities and Business)

general planning

use student nos to inform possible changes in accommodation for courses, some involves profiling forward existing nos, some estimates of new intakes, also new yrs of study (HE). this is an ongoing process

constraints exist from college timetable blocking system (college uses Celcat to achieve efficient usage of space)

force for change from split site nature of provision and expectation of loss of one building. Question of how to accommodate these students, requirement to be very sure of the data for planning - doubt as to accuracy of data held by others (eg estates). partly related to ongoing growth (new cohorts) of HE students.

information drawn from various sources and presented in various ways. Initially took paper plan of various rooms and indicate hours of usage and numbers, need to estimate group sizes and plan around central blocks. Planning for aspects of shift (eg geography need access to meteorostat dish). Many cases looking for related data. Process initiated by a programme leader who invested necessary time in checking and finding data.

Estates take no account of new third year.

data reliability

for current cohorts largely factual but slightly fuzzy at margin, can plan on basis of % progression and estimate entry nos.

for planning vip as know own timetable, need for accuracy rather than depend on others for information, need to have confidence and trust in the data - some questions re accuracy of central data. Imp to seek re-assurance, accept cost of duplication.

case of ownership of consequences and therefore pressure for accuracy.

data used in negotiation and advanced planning esp for knock on effects of moving from one site. Decision not (just?) based on quantifiable data but also interpretation with aim of (within college system) protect own situation and position (for students).

decisions, decisions

generally fall into two categories - simple problem solving, aim is to 'take a view', or support an opinion after matter already debated by others, choice between A/B - essentially trivial.

dec making per se - intuitive/subjective/some hard data, eg strategy and direction of college

plan, 'what if' considerations, perceptions based on calculation of risk and prior assumptions.

hunches - leaps in set direction, importance of setting clear direction and priorities - eg for bus management looking at where section will be by 2000, need to balance external constraints (college, FEFC) with desire to have own agenda considered - approx 80% of decision process external

vip - set agenda, take people with you.

eg bus/mgt is developing international links with college in Kobenhavn - originally generated by single lecturer, picked up and - correspondence traced back, scheme resurrected, in own mind = "good idea", benefits include the curriculum, EC, cross-involvement of students

decision making process from the top - personal involvement and drive,

this is the largest area in the college with 4 programme leaders so needs clear direction

problem is implementation not idea generation.

culture generally shared within college, college has strong interest in performance management and achievement, now accepted by managers and is feeding down to all staff, this level is developing.

budgets

staffing held centrally, consumables delegated within one section for 3 years, in others from now - new information needs, poss need to cross-check centre

central liaison officers have FIS role, closely involved in budget processes, employed within directorate of studies

higher education

initial focus was none offered within specific area - some offers to franchise yr 1 of specific courses together with HNC/D, initially contact with 'new' univ then Univ Leeds. Much more flexible, prepared to support PT/FT and also to validate programmes. Feeling of disquiet about implications of franchises in the long term.

Univ of Sheff offered validation for entire degree programme, v supportive. Feel limited by MASN below natural size of the provision, seen as partnership

staffing implications

new/shared loads, pre-qualified, confidence growing as scheme progresses, organic growth, small unit so staff accessible & supportive, timetable can be structured to students, culture of student care seen as a 'learning not a teaching college'

External Funding

basically a response & reaction when external bodies announce that funding is available

often with broad criteria such as 'training for the unemployed', funding from EC (Objective 2 'unemployment due to loss of major industries') either National or Sectoral, Regional or more precisely S Yorks/Deane Valley, also FEFC source, also TEC.

then need to identify - if interested; does it fit with other priorities; who to talk to internally - then bid preparation and writing.

often staff already have ideas and existing concepts, know who to contact to generate specific proposals

internal bids are analysed and sifted, submissions reviewed by Executive. If the project is a large one-off grant then will be significantly controlled centrally - often make judgements as to how much funding is available and then pitch to attract double the likely average (per college) allocation.

in past has proved successful strategy, also used in strategic development of the college, try to fit external support to internal need

external funding very important - reduce reliance on FEFC. An amount set into annual budget but college is flexible about this.

selection criteria

does the bid meet the external criteria?

will it continue to meet these criteria?

costs, and the range of bids submitted

prefer to bid for as much as is possible

rarely any internal competition, anything generated will be submitted, sometimes projects may be combined though;

past experience, records and special projects

has person recently had a successful bid - might be someone else's turn

can the recipients benefit if the bid is successful

Internal checking and processes

development projects are monitored during existence - work done, deadlines, expenditure;

delivery projects are treated as any other course so - biannual monitoring, student feedback, - possible that students would know it was a special project, scheme neither distinct nor that separate.

importance of this activity generally recognised & often seen as 'more of what doing anyway'

pilot bids, not FEFC sourced, to develop work related to existing areas (eg EC funds for language training). Particularly scheme unusual in that it was generated in depts and pushed forward with links to curriculum development.

record keeping & performance criteria

similar to other students
separate part of the main system
very flexible

main criteria is delivery rather than the actual use of the funding

projects kept discrete for budgets, can trace a student through the system, post event audits, monitoring is done elsewhere - records, finance returns etc

decision aids

no formal IT decision aids for above

emphasis on systems & checklists - problem often qualitative - who, what to ask, need to generate actions

use more formal systems for repetitive tasks, interrogations, and co-ord all very difficult for one off projects.

1-C-13

- Programme Leader Sciences

✓

CV
interview notes

Relocation

overall easier for Humanities to move (problem with labs etc), by preference no move but external pressure and solution - specific problems such as chemicals (safety)

Aids to decision making

personal reliance - other people, help generate information and options
number of constraints may leave only one feasible option.

need to take account of teams of people - mix of Programme Leader and APL for Maths, Physics, HE access, Chemistry.

Timetable

constraints revolve around:

staffing - max load, no of hours, other teaching
room availability
tutorial system and college timetable

need help but not via IT, as - cost of setting up is high, may use IT to record final version, magnetic board/paper pencil more readily visual

runs programme (CELCAT?) - to generate print outs, update etc, ok to use if the actual user but otherwise not very satisfactory.

Higher Education

very committed wish to see more, expansion had been caught by shift in govt policy, managed to retain existing provision but still wish to expand, because:

feel it makes college more attractive in drawing in post-16 students (local tendency of poor post-16 take up & as a result entry to HE historically low, poss linked with fear that people would then leave the area permanently);
attract different type of staff, leading to cultural change;
creates a momentum that feeds through into other classes
provision for A Lvl, GNVQ being augmented through better library provision and equipment.
desire to create a critical mass for further change

initial no tradition of HE beyond day release HNC, moves via franchised (Sheff Hallam, Leeds Met) science foundation years, students were theirs not Barnsley's. Preference for own degree and students. Access course now validated in its own right have found Univ Sheff very supportive. Turned down for validation of BSc (facilities), linked with loss of lab space, under pressure to improve room utilisation

from external (college), tendency to create general teaching rooms from labs

staffing well suited for HE work - (4 PhD), would need some updating of knowledge (has been a problem with humanities). Links with Sheffield have improved staff confidence.

Don't see this as competing with other local HE providers.

must be careful not to subsidise HE with FE monies.

Tertiary sector

entered into from 1980s, with other schools in area (except Penistone) unable to support 6th form provision. Allowed widening of provision, college formed late 1989 as amalgamation of 3 local colleges, since then move to incorporation. Funding situation has improved now out of LEA control.

some schools might want post-16 again but now lack experienced staff and level of resources.

1-C-15

B·A·R·N·S·L·E·Y
College

Cv
response to
follow-up letter

Our ref: ISS/JLH

30 August 1995

Mr Roger Cook
School of Social Sciences
City University
Northampton Square
LONDON
EC1V 0HB

Dear Roger

Thank you for your letter and copy of the notes of our conversation. I think that they are an accurate record of what was said and I hope they help in your final thesis.

Regarding my thoughts on the use of IT in the decision processes discussed. I daresay that it could be applied (as seems to be the case with just about everything these days) but I am not an IT fanatic and I should only use it if it was appropriate to do so. The situation in which I envisage a role for IT would be in the processing of data eg with regard to student numbers, courses offered elsewhere, demand for new courses, utilisation of resources etc and in the presentation of information.

I hope that these comments are of some use to you. Best wishes with the project.

Yours sincerely

Programme Leader Physical Science
and Mathematics

1-C-16

vi

Cvi
Interview notes

- Progress Training

working for company not college

decisions

new unit on Priory Campus, need systems and procedures to reflect information flows and to ensure cross-knowledge

information usage - database of external contacts, organisations involved in work based learning, contracts to organise and deliver in house. Systems needed that will spread knowledge and are also accurate. need for register of students and resultant income.

Growing training work so need new unit, volume will grow in long term so some extra staffing needed

type of systems - paper records, IT held at Belle Vue site, can be accessed at other site, info transfer, own system adapted for needs, 2nd site given subset of data with financial section removed. Prefer IT solution for all record keeping, compact size helps to maintain control over the core system (Uses Access)

manual transfer, will be on-line, trying to avoid any divergence in the data sets.

currently modifying before final version ready. Good support from computing dept. Access chosen as came with MS Office.

Type of records - add if needed for local needs, central control over key info for both sites, esp master list and finance, subset concentrates on attendance at courses. Should be no duplication, different levels of detail, problem and aspects different at the two sites.

Enterprise and the company organisation

charity - sep company to preserve status, can gift/covenant resources to the college.

enterprise proposals - initiated within their dept (?), set up via company and then sub-contract to the college, fees paid for programme training, sometimes depends on the type of course.

Information presentation for bids

standardised format for considering proposals -

has initiator considered all aspects? checked vs checklist

costings - type of course, adjust figures, can it be set directly within FE?

whether any interest/demand, need to advertise so costs/benefits

cost of failure

danger of losses - may still run without profits if college gets FE units and

1-C-17

Cvi

therefore funding from FEFC (?)

seek info from originator, past record of delivering, left to generate own costs and set a reasonable fee although may be some negotiation, basically looking to break even.

but....may be building block to further activity ie attract students, develop experience and expertise so financial not only consideration.

most initiatives are approved to run but recruitment closely monitored, project may be amended etc, good relationships with the originators.

- Assistant Programme Leader (Social Sciences)

general area, social sciences, levels from GCSE to degree, also vocational - psychology, social care, nursery nurses etc

facing cross-college FEFC inspection late 96/7, any inspection of HE carried out at validating institution

Timetabling

information needed such as details of individual courses on offer, staff availability, some restrictions such as college blocking system for set units, therefore complex matrix of staff involvement in different courses, also service work from/for other parts of the college

complexities derive from individual staff, constrained re number of hours to seek to optimise, without needing to use overtime, also different course lengths so different individual hours totals, different types of courses eg A Lvs, Degrees, GCSE, Community all impose own constraints.

A Lvl blocks are not flexible and most complex. Individual course co-ord work on own then collate, then consider servicing, then back to look at individual lecturers timetables - hopefully no major changes needed.

new features are year 3 of the degree and also need to allow students to take an external module to their main pathway.

done - 'paper, pencil, rubber'

lack of knowledge of other sections timetables, college controls room allocation and usage, allocate early september. get own stock of rooms and then negotiate with other areas - can be complex due to overestimation etc, do best to fit nos to room sizes

staff data is considered such as preferences and constraints - whether can cover twilight or later, teaching skills - also mixed contract base some fractional, some on old contracts, some on management spine so limited teaching hours. Aim to set target hours then mix loads for efficiency, preferences & skills, eg some degree classes need certain staff so these cannot be used for other classes.

leave classes that may not run till the last.

Planning Tools for Timetables

some use of IT system but used to spot problems (clashes) rather than for planning. Main tool is last year's timetable.

paper system gives a good visual record, overall system was inherited from previous postholder.

Other uses of IT mainly for production of lecture notes and (via CD Rom) to gather material, use of spreadsheet for data presentation (graphs) rather than the calculations, personal preference to rely on calculator.

Budgets

partly devolved for non-staffing budgets, given lump sum. delegate again, basically related to student numbers.

Planning numbers

A Lvl Psychology - numbers going up & consistent
other FE hard to estimate precise nos
evening courses - problem of drop outs and of when to organise extra cover

Higher Education

good idea leads to better resource base and also 'brownie points'. The HE work enhances the FE provision, also students from HE seem to have more ability to put pressure on the college, staff development opportunities.

does cause some management problems, some staff lack PG experience or of teaching to degree level, could enhance level of provision but for constraints from MASNs.

fit with local community? - not just local mature students but also attracting younger, non-local students, last year via clearing, this in UCAS handbook, keen to retain local dimension as conscious choice.

not seeking BPS validation.

students have needed help to understand how to move through the pathway, some core modules such as research skills & other requirements and progression arrangements. More complex now must take units out of pathway.

Usage of MPhil students to provide project supervision.

1-C-20

(vii)

B·A·R·N·S·L·E·Y

Ref: LW/LC

16 August 1995

Roger Cook
City University
School of Social Sciences
Northampton Square
LONDON
EC1V 0HB

response to follow-up
letter

College

Dear Roger

Thank you for the notes - I have annotated them in places, although they were an accurate representation of what was said.

At the present time I am involved with the UCAS system and entry to our HE courses. I know it's not something that we discussed per se but I imagine that it would enhance the accuracy of the current procedures. As we are just starting off in UCAS, I have had to deal with about 75 applicants for my course. All that exists are my paper based records with regard to decisions made like reject, conditional offer etc, if I've made the student an offer I can get a print out from Client Services which tells me if it is a firm or insurance acceptance but this is out of date. When the UCAS A Level results arrive pre publication date, these are recorded on d'Base by a Combined Studies team. It would appear that some kind of records system would be more efficient which could be updated as replies come in and that was accessible to all admissions tutors and not just Central Admissions Office.

With regard to timetabling, I suppose that some system would be useful although I would be reluctant to move away from a paper based system. If a programme could deal with all the anomalies of staff contracts, servicing etc, then it would be welcomed. What would be useful would be a system to work out averaging of people's hours against contracts and course length. Certainly the programme which works out timetabling clashes is useful but staff still resort to a paper based system to solve those problems.

I hope these brief notes are useful, as you can appreciate it is a hectic time of year and so I felt an early brief response was better than a very late one.

If you have any questions feel free to get in touch.

Yours sincerely

Assistant Programme Leader Social Science
Pathway Co-ordinator Combined Studies Degree
Social Science

David E. [unclear] [unclear]

ANNEX TWO:

BACKGROUND MATERIAL FOR CHAPTER SIX

Contents:

Letter sent to all potential case-studies

Pages 2-A-1 to 2-A-2

Letters, interview notes, repertory grids and completed questionnaires:

Page 2-B-1, Standard follow up letter
Pages 2-B-2 to 2-B-4, interviewee Di
Pages 2-B-5 to 2-B-8, interviewee Dii
Pages 2-B-9 to 2-B-12, interviewee Dii
Pages 2-B-13 to 2-B-16, interviewee Div
Pages 2-B-17 to 2-B-21, interviewee Dv
Pages 2-B-22 to 2-B-24, interviewee Dvi
Pages 2-B-25 to 2-B-27, interviewee Dvii
Pages 2-B-28 to 2-B-32, interviewee Dviii
Pages 2-B-33 to 2-B-35, interviewee Dix
Pages 2-B-36 to 2-B-39, interviewee Dx

Statistical Analysis of Questionnaire Returns

Pages 2-C-1 to 2-C-2

Response from the College

Page 2-D-1

Letter sent
to potential colleges &
Universities

2-A-1

73 Serpentine Road
Kendal
Cumbria
LA9 4PD

16 May 1997

XXX

XX

Dear XXX

I am writing to you to seek your help in completing my PhD project.

I have been carrying out research into how organizations use decision aids in the course of decision making. One possible aspect of this is the design and use of the type of Resource Allocation model being developed in many HE Institutions. Such models often embed a variety of assumptions as to appropriate cost-drivers and in how they allocate the income received by the University. To help place the research in context I have also enclosed a copy of an abstract of a paper I am due to present at the British Academy of Management conference in September.

I am carrying out this research as a part time student with the Open University Business School and I am currently working as an administrative assistant in the Lancaster University Planning Office.

The research methodology has been designed so as to minimise the burden to any organization involved and revolves around interviewing 10-15 (rather variable) staff and then conducting some follow up correspondence.

The staff would ideally cover a spread of those who designed or commissioned the system, those who use it in their day to day work and others who are affected by the resultant choices and actions. The interviews tend to take around one and a half hours and are a two stage process:

- a general review of relevant issues and factors;
- a detailed analysis of the problem being addressed in the decision aid using the concepts and tools of Personal Construct Theory to generate a grid that encapsulates the individuals views and opinions

After the interviews I will return transcripts and the completed grids to the individuals concerned so that they can check for accuracy etc. Following this, the intention is then to ask all interviewees to rate the grids completed by their colleagues (anonymously) to indicate the extent of their agreement. These two stages will be completed by post.

2-A-2

Obviously the reporting of the case study in the published thesis would be anonymous, although if wished I would be more than happy to cite the help of yourselves in the acknowledgements. Equally I would be more than content to return a copy of the relevant chapter to yourselves for the correction of any factual errors or clarification of misunderstandings.

If you would like to discuss this further you can contact myself on 01524-594204 (or email Roger.Cook@Lancaster.ac.uk) or my supervisors, Dr G Mallory and Professor R Kaye at the Open University.

I have enclosed a stamped self-addressed envelope.

Yours Sincerely

Roger Cook

2-B-1

73 Serpentine Road
Kendal
Cumbria
LA9 4PD

4 September 1997

Dear

Please find attached my notes of our conversation and the Repetory Grid you completed.

Could you check through the notes to see that they are a reasonable record of what we discussed and are accurate in what they are attributing. I've done a little bit of re-ordering and organising of topics, otherwise they are a fairly direct transcript of my written notes whilst we were talking.

Many thanks for you help so far

Roger Cook

Typical example of
a follow-up letter with
transcript & questionnaire

Interview with _____ transcript of written notes

Held 29/7/97, 10-11.15

General notes: 1st interview, Head of _____, College of General and Social

Information Systems in use

CovTec is the main system used by the College, holds basic student data and is ok for generating an individualised student record. Relatively simple additional processes such as recording student achievement needs a considerable amount of additional work. CovTec in a number of ways is seen as "quite poor" and strong feeling that other packages would better serve the information needs of the sections.

Spreadsheets are used to capture budget data, at the moment actual entry of targets and estimates of income etc is done by each individual section. This is often frustrating leading to an impression of "drowning in paper" and the constant need to generate raw data that could be supplied centrally is leading to course leaders being "fed up doing it".

Of considerable use would be the introduction of some sort of IT help for timetabling which is at the moment a manual paper and pencil task.

Spreadsheet is devised by the Dean at faculty level to explain the distribution of financial resources between sections, this is an open process, v much welcomed.

Information needed

in the main to estimate future funding and the target setting process, can be difficult as this implies needing to estimate likely destinations at the end of the 97/8 academic sessions, so far estimates have been good but this may be more 'luck'.

Some of the problems in this respect are specific to the courses offered by the section, eg First Aid courses are only 9 hours long and run many times a year, nonetheless some funding is tied to outcome destination statistics.

Data Provided by the College

in the main this is just the guidelines for the process, with estimates of student numbers and outcome rates being entered from information held by the college.

This may need to change owing to the shift in FE funding rules so that funding is no longer so demand led, instead targets are set which cap the number of units which will be fundable. Thus for the college to exceed its target will generate no extra cash, hard to judge for an individual section though, as it may be possible to exceed own targets and be allocated cash drawn from another area that is not achieving its targets.

Allocation of course units between sections has been done on the basis of previous performance ... overall this is leading to some revisions in how people manage recruitment onto their own courses.

In many ways feel that the college doesn't provide sufficient data in respect of students or finance and instead relies too much on material provided by the sections (even when this is already held centrally).

Changes

In many ways positive for section in recent years with allocation of extra members of staff and an acknowledgement that the college could grow in health related areas.

Staff Contracts

the concern that staff are failing to cover their apportioned hours was a function of senior staff operating on flawed data. Partly that the data recorded on the registers was not the whole picture but also that errors in completing the registers would lead to their rejection by registration - the process v much one of 'frustration'

Di
Repertory Grid

Question:	What are the main aspects of the College's information/decision aiding systems?						
	Elements						
Constructs	Financial Data	CovTec Student Record System	Individual Course Leaders	Formal Management Meetings	Individual, informal meetings	Faculty spreadsheet data	Scale (5-1)
Is the system computer based?	4	5	1	3	3	5	Yes-No
Is the information held and elicited from individuals informally?	5	5	1	3	3	5	No-Yes
Is the information highly structured?	5	5	2	3	3	5	Yes-No

2-B-4

Interview with _____, transcript of written notes

Held 7/8/97 14.00 - 15.15

General notes: 1st interview, Head of

University College

Information Systems in use

Primary source of staff/student data is CovTec which is used to log enrolments, exam successes etc. Also the two (FE & HE) registry offices. A financial MIS (Dolphin) also exists and all budget holders have access to this and query comment on its reports. Usually most sections also maintain local records as a cross-check.

Less formal sources include colleagues and from long experience within the college knowing "who to ask for relevant information".

In support of Resource Allocation/Budgeting processes

Spreadsheets are sent from the centre and passed to section heads for them to do the forecasting and inputs, used to calculate the units for inclusion in the business plan and thus determine income/expenditure, in effect it becomes the Resource Allocation tool determining Staffing etc.

Within the dept, the process is very much one of basing forecasts on figures from previous years, such as potential enrolments, likely retention rates etc, the course leaders then comment on these, before they are adjusted to present a 'departmental' view.

Given change in FEFC rules (ie a cap on student numbers), the system has become more centralised, ie targets for income and of expenditure levels within that target .. this has started to replace the old culture of "expand" - create new courses/markets & promotions - to grow and instead to critically examine current provision - "view on new course proposals", remove uneconomic courses from the portfolio and also staff are now encouraged to meet the targets but not to over-reach. In this respect though there may be later pressure to take more students so as to pick up on shortfalls elsewhere in the college?

Annual Performance Reviews

this is a monitoring exercise designed to review predictions etc vs outcomes at various stages. Targets are set April/May for the following academic year and then reviewed in October, predictions are redone at this stage, there were 2 rounds last year, likely to be 3 this time. Process is accepted and is "no real problem".

Basic Record System

CovTec is seen as having some important weaknesses, in particular that it is not very good at generating data for internal use. For example would be useful to be able to extract previous data on retention rates for the October review but to date this has not been accessible. In the main it is seen as being weak as an analytic tool and also demanding the same data more than once - "a leech that sucks data out".

Some changes to this may be planned, although this may be no more than a perception that the central units were becoming more "internally customer focussed".

Would appreciate some say in the information collection process, in particular to avoid duplication and improve data accuracy.

No particular problems from having to deal with two registry offices, mainly as work in the dept is 90% FE.

Financial System

This generates monthly reports on outturn vs budget estimates, checked against own section records, mainly to correct mis-codes etc, this is usually straightforward but some of the records are manual not IT and the resultant outputs are "not that user-friendly", the detailed reports can be full of jargon and a terminology different to that used in the dept .. overall quite happy with this system though.

Dii
Reportary
Grid

Question:	What are the main aspects of the College's information/decision aiding systems?						
	Elements						
Constructs	COVTEC	Dolphin (Financial System)	Student Services	Section Meetings	College Management Group	Management Forum	Scale (5-1)
Nature of the Information	1	1	2	5	5	5	Qualitative- Quantitative
Focus on 'core' academic concerns	1	1	2	4	4	4	Yes - No
Focus on course information or financial concerns	2	1	3	4	4	4	Courses - Finance
Planning for the future or recording the present	3	2	2	4	4	4	Future - Present
Focus on internal data or external customers	1	1	4	4	3	3	External - Internal

2-18-7

Dii
Questionnaire
Response

Name:

Extent to which individual grids match own response to the question?

Grid No:	Totally Disagree	Neither Agree nor Disagree	Totally Agree
1			✓
2			✓
3		✓	
4			✓
5		✓	
6		✓	
7		✓	
8			✓
9		✓	
10			✓

To what extent do you agree with the Institute's Resource Allocation Process?

Totally Disagree	Neither Agree nor Disagree	Totally Agree
	✓	

To what extent do you agree with the Institute's Resource Allocation Decisions?

Totally Disagree	Neither Agree nor Disagree	Totally Agree
	✓	

Interview with _____, transcript of written notes

Held 14/8/97 11.00 - 12.15

General notes: 1st interview,

Information Systems in use

Primary finance system is 'Dolphin' into which actual budget details are entered once these have been approved and the funds allocated by individual budget holders, this is then used to generate Management Accounts and Cost Centre reports for budget holders.

CovTec is used to derive FEFC units for funding with data on enrolments, retention etc. Some manual cross-checking with depts is also undertaken as the system is weak in terms of how easy it is to generate useable reports.

Budgeting process

Progress on budgets is reviewed on a monthly and termly basis in respect of both income and expenditure.

There are differences between the HE and FE sides, in most respects the HE is simpler and the main piece of data for decision making is the MASN. As FE is more volume related there are complications of needing to forecast enrolments, retentions etc, esp as this needs to be done well in advance.

The process begins Feb/March when the College applies to FEFC for next year's quota, this is done looking for growth year on year but this may not be allowed, allocation of 517,000 funding units so College plans to recruit/enrol 524,000 so as to secure the funding base, these units are spread across some 8-900 individual courses. At this stage they are broken down and allocated to individual departments as targets .. so they then undertake their business planning knowing the actual FEFC units (ie income) and a 'stand-still' expenditure budget (with central provision for any pay rises).

Staffing complement is a product of FT staff and unfilled vacancies, incremental drift etc plus PT element, these then form the first call on each depts expenditure budget, process is via Deans who can re-allocate the income between their sections as they see fit.

To some extent the budget process is 'devolved', approval for new staff is centrally controlled but the depts are otherwise shown all their own income and all their own direct costs.

Monitoring is at section head/Dean level via performance reviews, where forecasts of income and expenditure are reviewed and revised. Within most of the Faculties there are a mix of financially successful and unsuccessful depts - Dean can operate cross-subsidies but long term aim is for all units to move to equilibrium, defined as expenditure being within a certain % of income (60%). The FEFC national model is being used to drive this move towards

convergence.

The reviews will seek to identify ways in which income can be increased or expenditure decreased or work practices reviewed. In any case academic or strategic arguments may well argue that the college continues with 'loss' making activities, in this respect it has no desire to pull out of providing A Levels etc although there is considerable local competition. Essentially this is an aspect of the overall provision that it is desired to retain, although staffing and marketing are under review to see if improvements can be made.

The internal income allocation model, attributes 100% of income (using FEFC units and prices, or the HEFCE grant) to depts and then sets expenditure at 60% of this. This works as in particular the FEFC funding process is so much driven by activity. Nonetheless, the introduction of the recent cap in FEFC numbers will have some implications.

Question:	What are the main aspects of the College's information/decision aiding systems?								
	Elements								
Constructs	FEFC Funding Units & Internal monitoring	Staff Numbers and Costs	Funding Council Grants and Fees	Need for Capital Investment	Room Utilisation	MASN Constraint	Financial System - Dolphin	Class Registers	Scale (5-1)
Is this an internal or external measure of activity?	3	1	5	1	1	5	3	1	external - internal
Is this a measure of current activity or of a future target?	2	3	5	3	1	5	3	1	future - current
Does this set or monitor a target?	4	2	1	3	4	1	4	5	monitor - set
Is this a measure of costs or of activities	5	1	1	1	5	3	1	5	activity - costs
Does this relate to current activities or to planning for the future?	1	3	3	4	3	2	3	1	future - current
Is this a measure of student activity or of costs?	1	5	5	5	2	1	5	1	costs - students
Is this not related to students or focussed on them?	1	5	3	3	1	1	5	1	non-stdt - student

Diii

Repetary And

2-B-11

Diii
Questionnaire
Response

Name:

Extent to which individual grids match own response to the question?

Grid No:	Totally Disagree	Neither Agree nor Disagree	Totally Agree
1			✓
2			✓
3			✓
4		✓	
5			✓
6		✓	
7		✓	
8		✓	
9			✓
10			✓

To what extent do you agree with the Institute's Resource Allocation Process?

Totally Disagree	Neither Agree nor Disagree	Totally Agree
		✓

To what extent do you agree with the Institute's Resource Allocation Decisions?

Totally Disagree	Neither Agree nor Disagree	Totally Agree
		✓

Interview with transcript of written notes

Interview Notes

Held 26/8/97 8.30-9.45

General notes: 1st interview, Dean,

Institute Level

Student Numbers - here there have been changes this year connected with enrolments, member of staff () has set up a package that so far has given weekly numbers per courses (now daily) and is v useful.

This should reduce reliance on Section Heads completing paper (one section does use its own database) returns of enrolments.

In mid-September will review class sizes to see which if any will need to be stopped, again hope is to use new package rather than rely on section head returns.

Information also comes from CovTec but this is rarely accurate and is particularly vulnerable to delays in recording student withdrawals, sometimes to the extent of being very misleading.

Decision Processes involve two performance reviews in November and Feb, here retention rates are very important as by then actual enrolments are known. Judgemental by Section Heads. This data is then entered onto a spreadsheet, forms major in-year review.

There is an internal (College) version in May, looking to review income and expenditure & any other variances.

Previously the target setting has tended to be internal (ie bottom up) but changes in the FEFC rules have made hitting a precise number of units for the Institute of greater importance, new target is slightly above 96/7 actuals. No increase in funding though, so using a standstill budget and much more is at risk financially from any short-fall, also no extra funding if exceed target.

At one stage in the bid process there was a fear that FEFC would cut the number of units by some 40,000 - this led to some contingency planning as to how to absorb the cut and related staffing implications.

Inter-College arrangements

This year has been simplified by the relatively stable volume of units and decision to stick to previous year's budgets. Some feel for relative efficiency between the three colleges but with a few unresolved items - such as who pays for the HE Registry.

Overall any case for higher expenditure would have to come from other colleges or to increase the 60% of income flowing into the colleges.

Processes within the College

The business planning round starts in May, now much more focussed with each section being given a target for expenditure and volume of units, now "more realistic" and less a series of "wish-lists"

Need to ensure that targets of sections add up to those set for the college, no real mis-match this year so no need to look for new business etc.

Around 5% of the budget is held back until enrolments are confirmed. Given the proportion of income given over to staff salaries this is actually a sizeable amount and would need to be found by reducing expenditure on Part-time staff and consumables. So far this scenario has not actually happened.

If so then there would be a need to re-order the portfolio of courses being offered.

Can now use IT to cross-check views of section heads, but still a need for them to forecast ("guess") drop-out rates etc.

Other items include a need for more accurate data with respect to salary information etc.

Used new software to query the DLE (Demand Led Element) return to FEFC, found considerable variances between that and the views of the section heads, variety of reasons some of which are down to technical coding of units within the return. Considerable time and effort was devoted to checking the reasons though.

Question:	What are the main aspects of the College's information/decision aiding systems?								
	Elements								
Constructs	COVTEC	September Reviews with Section Heads	Performance Reviews	Ratio of Expenditure to Income	Retention Rates (Student Progression)	Actual Achievements (Student Enrolments)	Recruitment	Audits of Registers	Scale (5-1)
Basically a checking device	3	5	5	1	1	1	3	4	Yes-No
Used for actual decision making	2	5	5	4	5	3	5	1	Yes - No
Data comes from Section Heads	1	5	5	4	4	4	4	1	Yes - No
Financial Importance	1	5	5	5	5	2	5	1	High - Low
Actual rather than predicted data	3	4	2	2	5	5	5	5	Actual - Predicted
Key event with major implications	1	5	4	4	5	2	5	1	Yes - No
Measure of the quality of the College's work	1	3	4	2	5	5	3	1	Yes - No

DN

Repertory Grid

2-18-15

DN
Questionnaire
Response

Name:

Extent to which individual grids match own response to the question?

Grid No:	Totally Disagree	Neither Agree nor Disagree	Totally Agree
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

To what extent do you agree with the Institute's Resource Allocation Process?

Totally Disagree	Neither Agree nor Disagree	Totally Agree

To what extent do you agree with the Institute's Resource Allocation Decisions?

Totally Disagree	Neither Agree nor Disagree	Totally Agree

Sorry this is
so late.
Hope its still of use

Dr Interview Notes &

2-B-17

Response

73 Serpentine Road
Kendal
Cumbria
LA9 4PD

29 August 1997

Dear

Please find attached my notes of our conversation. Sorry that we rather ran of time at the end in terms of completing the grid, as I'm down on Tuesday anyway is there any point to spending say 20 mins later in the afternoon (3ish)? to pick this up?

A fax should already have winged its way to you with my Dearing notes.

Could you check through the notes to see that they are a reasonable record of what we discussed and are accurate in what they are attributing. I've done a little bit of re-ordering and organising of topics, otherwise they are a fairly direct transcript of my written notes whilst we were talking.

Many thanks for you help so far

Roger

Roger Cook

Roger, The notes look fine One or two minor comments (*)

- a) I think this is more positive than it sounds here we are (I think) unique in our F/HO work and this brings managerial/cultural/administrative systems issues which need to fit "all cases in all instances" - which is difficult.
- b) There is some recognition of the ALFs for the FE part of University College as an influence on our thinking.

Thanks

Interview with transcript of written notes

Held 28/8/97 8.30-10.00

General notes: 1st interview, Dean,

Institute Procedures

Forward planning revolves around two major elements .. first the strategic plan which is very driven by the requirements of FEFC with tight guidelines etc, HE only really appears as an appendix. The document is a complete statement of the work of the Institute and HE seems only to be there for completeness. It is not submitted to HEFCE so does not need to reflect that set of priorities etc.

Seeking to introduce a "living document" for the HE College from which other actions etc would flow, also important way of starting to address the post-Dearing environment.

Feeling that split between FE and HE has led to the Institute being "rather disarticulated", though some of this may be a product of being new in the post.

The student number process is again v much driven by the needs of FE, with all planning and audit revolving around the ISR. FE student market is also very fluid, process is dominated by the FEFC unit model, with all the record system geared to their counting and performance related to FE enrolments/retention.

Within the HE college the MASN takes prime importance, concerns of balancing vagaries of clearing, resits etc so as to emerge with the correct number of students.

Despite these FE/HE differences being "very careful" to try and manage the situation so as to emphasise the similarities not the differences, particular so as to maintain co-ordination at the Institute level, this is a role of all 3 of the Deans as a group. Note also that HE College must take account of Manchester Uni as validator for the degree programme ... this adds more constraints to the broad planning context.

Resource Allocation is driven by anticipation of student enrolments and the resultant setting of budgets, based very much around fixed staffing costs, allocation to the college is a global sum that, at least in theory, can be allocated to specific departments as desired. The individual business plans "statements of need" of the individual sections are very much the basis for the subsequent resource/budget setting process. 5% of the budget is withheld until actual recruitment is known.

Process is very much top-down with the priorities of the Principalship very much driving the decisions. Institute has had some concerns as to whether FEFC would make available the sum entered into the budget process - in outcome yes. This central view is particularly important for setting out which areas will be allowed to expand and informs perception of local market etc.

Within HE College

The HE recruitment targets are broken down to course/programme level, this is done so as to sustain current staff numbers & to a limited extent allow growth of new areas (eg a SH degree). Within this the MASN is the obvious constraint but is also useful in that by setting such a rigid parameter it removes many sources of argument. There is no internal note taken of the AUCFs.

The Institute and the college are vulnerable to external changes, particularly HE. Example being HEFCE proposals to remove £600-£800k of the block grant on the grounds that FEFC fund the infrastructure. As a result planning process and horizon is very externally focussed, also need to absorb implications of Dearing.

Shift to more sub-degree work may dilute mainstream degree work to the extent that this slips in the institution's priorities, fundamentally HE needs FE environment to be viable with only some 1200 FTEs. - unless relationships with Manchester Uni can be 'tweaked'

Budget setting within the college is very much constrained by existing staff commitments etc, note that there is no use of 'recharges' in the budget process. Process is 'managed' via the bi-annual performance reviews, Institute has a major signal of efficiency that not more than 60% of income is spent by the relevant section/college, only 1 dept within the college is above this. Institute is verbally committed to convergence, but this is limited in practice with little action being taken to tackle 'outlying' depts .. prefer to retain internal subsidies but to make these clear and transparent.

Scope for manipulation of budgets and thus restructuring is limited due to volume of fixed costs, however strategies are available .. one route is with section heads to review staff timetables which are incrementally devised as enrolment situation is clarified and inter and intra-college servicing arrangements finalised. Feeling amongst HE staff is that Institute has HE on the cheap as very high SSRs and similarity of contracts with FE staff. This is equitable but does not fit a 'normal' HE profile, so using timetable to generate time efficiencies to release staff from T for other reasons (eg research), total volume of 8-10% of available staff time.

In many ways Institute dominated by "FE mentality" with a highly mechanistic approach to Management Info and indeed what constitutes valuable data. This is hard to apply within HE, but there is some "residual watching" of HE by FE, "not very helpful". Important for research question in that the type of data sought, and assistance used, in HE decision making can be radically different to that accepted and sought for FE. Some of these perceptions may be personal but there are real problems with "a collision of cultures", being "hard to manage".

Even within HE college, significant FE work, of 5 sections, 2 have substantial proportion of their work at the FE level (& thus fit with Institute culture), 2 only marginal and 1 not at all. Thus problems with the returns and the information gathering process (eg attendance registers). Hence importance within job of "trust building".

Question:	What are the main aspects of the College's information/decision aiding systems?									
	Elements									
Constructs	Strategic Planning Process	Management Meetings	MASN	External Environment (Std demand etc)	External Funding Rules	Performance Reviews	Management Information Unit /Systems	Section Heads	Strategic view of the college's overall direction	Scale (5-1)
More relevant to Policy formulation or actual implementation?	2	5	1	1	3	5	3	5	2	Policy Implemen- tation
Provides basic information for decision making?	1	2	5	5	5	1	5	3	3	Yes _ No
Is an aspect where the Institution has freedom to control environment?	5	4	1	1	1	1	1	2	5	Yes _ No
Is a means of reviewing actual performance?	2	4	1	2	2	5	5	4	4	Yes _ No
Is a factor internal to the Institute?	4	5	2	2	2	4	5	5	5	Yes _ No
Provides basically numerical data?	4	3	5	4	5	5	5	3	3	Yes _ No
Provides factual data for decision making?	2	2	5	5	5	4	5	2	1	Yes _ No
Is focussed on the development of ideas?	5	3	1	3	2	1	1	3	5	Yes - No
Represents a brainstorming process?	5	4	1	1	1	2	1	4	5	Yes No

2-B-20

Is Repertory And

Dv
Questionnaire
Response

Name

Extent to which individual grids match own response to the question?

Grid No:	Totally Disagree		Neither Agree nor Disagree		Totally Agree
1				✓	
2					✓
3			✓		
4				✓	
5					✓
6		✓			
7			✓		
8			✓		
9					✓
10			✓		

To what extent do you agree with the Institute's Resource Allocation Process?

Totally Disagree		Neither Agree nor Disagree		Totally Agree
			✓	

To what extent do you agree with the Institute's Resource Allocation Decisions?

Totally Disagree		Neither Agree nor Disagree		Totally Agree
			✓	

Interview withtranscript of written notes

Held 2/9/97, 10.00-11.00

General notes: 1st interview, Cert Ed, University College

Information Systems

This very much revolves around the Management Information Unit (MIU), basically being based on the class registers, and an overall process of tracking students through enrolment, attendance and completion. The emphasis has changed since incorporation with the FEFC places monetary value on student activity, the result is one where this sort of checking and tracking is much more relevant.

The registers must be accurate as they are subject to FEFC audit, however, for a section such as Professional Studies this is difficult as there is considerable off-site contact with the students that needs to be recorded as well as seeing a cohort split down into individuals, esp when observing teaching practice. In fact have a need for more boxes/options than the register currently offers. At the moment the section is using 30-35 registers between 2 FT and 3 PT staff.

They are submitted each week and returned with 'rejection notes' if any data is wrong, missing or inconsistent.

Part of the enrolment process is to allocate the student a unique number which is recorded in the register, thus any non-enrolled students attending classes are picked up at the end of the first week. During the enrolment period accurate information is crucial, need own records etc and set up student file, very much a process of tracking and checking. At this stage it is very reliant on the individuals actually dealing with the students.

In terms of the overall student record are seeking to develop and improve on systems within the section so as to fill in the few gaps in the formal Institute processes. The whole philosophy is very much a response to the demands of the FEFC.

It works well, but there can be problems obtaining information from the central record rather than providing it to it. That held locally is partly a response to this and partly a desire to hold some information that is specific to the section's needs.

The enrolment target is set internally, although there is some negotiation between this and the overall needs of the institute. Work of section is split between a Cert Ed (funded by HEFCE) and CGLI 7307 funded by FEFC, roughly 50:50 split.

However, working approach is very much determined by the demands of FEFC.

Overall feel that the system works well, but the volume of admin can be frustrating with an awful lot of cross-checking.

Question:	What are the main aspects of the College's information/decision aiding systems?					
	Elements					
Constructs	Details on Enrolment Forms	Details on Class Registers	Tracking forms and systems	Course Reviews (Monitor, Review Evaluation)	End of Year Status report for individual students	Scale (5-1)
Day to day information or provides a more holistic view of the student?	4	3	2	1	1	day to day - holistic
Used in pastoral role or for Management Information?	2	2	1	1	1	Pastoral - Managerial
Contains purely factual information about the individual student?	4	2	3	2	3	Yes - No
Contains wider element of personal information - more student as a person?	4	1	1	1	2	Yes - no
Information is needed for funding purposes	5	4	4	5	5	Yes - no

Dvi
Reportary Card

Dvi
Questionnaire
Response

Name:

Extent to which individual grids match own response to the question?

Grid No:	Totally Disagree		Neither Agree nor Disagree		Totally Agree
1	<input checked="" type="checkbox"/>				
2				<input checked="" type="checkbox"/>	
3			<input checked="" type="checkbox"/>		
4				<input checked="" type="checkbox"/>	
5		<input checked="" type="checkbox"/>			
6	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
7		<input checked="" type="checkbox"/>			
8		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
9			<input checked="" type="checkbox"/>		
10				<input checked="" type="checkbox"/>	

? entry. check by phone

To what extent do you agree with the Institute's Resource Allocation Process?

Totally Disagree		Neither Agree nor Disagree		Totally Agree
<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>

To what extent do you agree with the Institute's Resource Allocation Decisions?

Totally Disagree		Neither Agree nor Disagree		Totally Agree
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>

2-13-25

Dvii
Interview
notes

Interview with _____ transcript of written notes

Held 2/9/97, 13.00-14.00

General notes: 1st interview, Lecturer, Social Care

Information environment is set by a mixture of elements within the College, various validating bodies, Community Liaison work, national press and line management.

Processes with students quite strongly structured to provide pastoral care and also career development, ethos that they are "students in our care". Most students on programmes within the section undergo a work placement, so finding/monitoring these is an important dimension.

For the college/FEFC must monitor the number of students, their attendance, completion rates etc, also done informally as tend to know them as "individuals not just names". This focus on the process aspects is new and a product of the introduction of the FEFC following incorporation.

To assist with record keeping/access have asked for network connection to CovTec, this is still outstanding so need to put requests in writing and send to an operator to input etc, actual response times are good but would prefer own direct access. Local records are very much paper dominated, with personal details, records of attendance etc.

At the moment are being often asked to provide data on actual enrolments (prob till November), also asked/expected to provide data for the annual reviews and to gather (& report) student opinion on their courses.

Some monitoring of staff activities through the weekly registers, actual timetables are set by Head of Section, monitoring process (registers) is substantial and somewhat a "waste of time and paper".

Community Liaison is important so as to place students on work experience in local Nurseries, Hospitals, Private Homes etc. Also can then offer courses such as First Aid to community groups, external role is very important part of own job. Also then can ask external people to come to college and give presentations to the students.

Helps with setting up career opportunities for the students, in this respect also set up open days with HE providers.

Question:	What are the main aspects of the College's information/decision aiding systems?						
	Elements						
Constructs	Overall College Ethos	Section Ethos	Funding Rules	Requirements of the validating bodies	Internal Record Systems: Registers, CovTec etc	Community Liaison Requirements	Scale (5-1)
An internal factor in decision making?	5	5	5	4	5	3	Yes-No
Used for external (to self and own courses) monitoring processes?	5	5	5	4	5	3	Yes_no
Something that I can personally influence?	3	4	1	1	3	4	Yes-No

2-8-26

Dvii

Repetary Grid

Dvii
Questionnaire
Response

Name:

Extent to which individual grids match own response to the question?

Grid No:	Totally Disagree		Neither Agree nor Disagree		Totally Agree
1					/
2					/
3					/
4					/
5			/		
6					/
7					
8					/
9					/
10					

To what extent do you agree with the Institute's Resource Allocation Process?

Totally Disagree		Neither Agree nor Disagree		Totally Agree
		/		

To what extent do you agree with the Institute's Resource Allocation Decisions?

Totally Disagree		Neither Agree nor Disagree		Totally Agree
		/		

Dviii
Interview notes &
Comments

2-B-28

73 Serpentine Road
Kendal
Cumbria
LA9 4PD

3 September 1997

Dear

Please find attached my notes of our conversation and the Repetory Grid you completed.

Could you check through the notes to see that they are a reasonable record of what we discussed and are accurate in what they are attributing. I've done a little bit of re-ordering and organising of topics, otherwise they are a fairly direct transcript of my written notes whilst we were talking.

I have also enclosed a draft of the conference paper I mentioned.

Many thanks for your help so far



Roger Cook

Roger,

5.9.97

I have amended some
of the original responses on the
Grid, the constructs sunk in a
bit more when I reflected on
them. Thanks for the paper
See you soon

Interview with , transcript of written notes

Held 2/9/97, 8.30-9.45

General notes: 1st interview, Head of Business Studies, University College

Institutional Processes

Start with the Business Planning process, very much an operational rather than strategic dimension, picking up on staff hours required, consumables, rooming etc, overall takes an "inordinate amount of time". Compiled with pro-formas, once submitted, the process is something of a "blackhole" until later when the budget is notified, this seems not to reflect the requirements identified in the original plan.

The pro-forma very much constrains the process, feeling that it is very FE driven, "written for FE people" and some of it makes very little sense in a HE context. In a general this leaves staff in HE with a feeling of being monitored and feel "wary about how to make these returns".

As example, launched new PT degree, id new staffing etc, no allocation, equally even if staff are agreed then approval is needed again via separate process.

So plan rather divorced from strategic direction, much more performance and budget monitoring, feeling that it involves too many "closed doors".

The performance reviews compare Income against expenditure, lot of emphasis to this fairly crude ratio that ignores different patterns of teaching (& thus costs) for different subjects, also no reflection of the difference between FE and HE .. notional plan for convergence at around 60% ... but not pursued that actively.

Feeling that HE monies are placed in a general pot with the FE funding and allocated throughout Institute.

Specific concerns for the IT equipment base and the lack of long term purchasing/replacement policies. Also practical control of IT is diffuse with for example the head technician having considerable veto over what is done/bought. Again feeling that information is sought (eg recabling of the campus) but not used, nor any feedback received.

The committee system is mainly 'talk' not 'decisions' and feel it to be "a bit of a waste of time", also often sees the same people at all committees, still working to same agendas.

Within Section

Try to involve staff, prepare and discuss bids for resources, can set up own priorities, at the moment seeking a PC for every member of staff, this of course needs to be balanced against other points and teaching is seen as very much the primary aim.

Student Record

Within section, trying to shift this to IT, member of staff working up a system based around MS Access, this is developing organically, can now handle timetable, room utilisation etc.

CovTec is seen as demanding too much information "tail wagging the dog", seen as another way of checking up on staff, part of a culture of lack of trust... needed to underpin the FEFC funding units, again an FE need imposed on HE

Class registers are time consuming, again feeling that never used for own benefit, sense of providing but never receiving information

General view that central ^{business (eg Finance, Personnel, IT Services)} ~~student~~ services are not responsive to the needs of individual sections, rarely explain why info is needed, not an academic support service, more a "detached" taker and user of information.

Financial records

Here feedback was requested to improve quality and value of printouts from Dolphin, no real response, thus have now developed own in-section spreadsheets to monitor budgets and expenditure.

Overall

need for more openness and transparency in decision processes, also lack of a strategic view .. staff feel strongly the lack of responsiveness by the Institute.

Question:	What are the main aspects of the College's information/decision aiding systems?								
	Elements								
Constructs	Business Planning	Committee Structure	Institute Support Systems	Student Record Systems	Budgets	Institute Control Systems	Performance Reviews	Strategic Planning	Scale (5-1)
Monitoring System	5	1	4	4	5	5	5	1	Yes-No
Degree of co-ordination	2	1	1	3	3	4	2	1	High-Low
Is there shared understanding between parts of the Institute?	1	1	1	2	3	2	1	2	Yes-No
Is the element concerned with control or with resource allocation	1	3	3	3	5	3	5	3	Control-Resources
How appropriate is this element to the work of own section?	5	1	1	5	3	5	3	3	High-Low

Dviii

Repetory Grid

Dviii
Questionnaire
Response

Name:

Extent to which individual grids match own response to the question?

Grid No:	Totally Disagree	Neither Agree nor Disagree	Totally Agree
1		✓	
2			✓
3			✓
4			✓
5			✓
6		✓	
7			✓
8			✓
9		✓	
10			✓

To what extent do you agree with the Institute's Resource Allocation Process?

Totally Disagree	Neither Agree nor Disagree	Totally Agree
	✓	

To what extent do you agree with the Institute's Resource Allocation Decisions?

Totally Disagree	Neither Agree nor Disagree	Totally Agree
	✓	

2-13-33

Dix
Interview
Notes

Interview with . . . , transcript of written notes

Held 2/9/97, 10.00-11.00

General notes: 1st interview, Professional Studies, University College

General Processes

Most important dynamic is the demands of FEFC and HEFCE, within section funding is split roughly 60:40. The targets set within the section are own expectations based on judgement of external environment and trends. Some negotiation as to level, over-riding aim is that they must be achievable given financial penalties otherwise.

Other important constraints on the actions of the Institute are its desire to play a role as a Community College, so may well support programmes/awards that are not strictly cost effective.

Budget planning process is a series of allocations, first to the 3 colleges, then to their constituent sections, since the FT salaries are a major fixed element then there is little leeway for practical allocation decisions. Nonetheless, Business Planning process is important, the process has been tightened up following the issuing of new guidelines so its no longer such a "hotch-potch". For the FE side the environment is set through FEFC allocating so many units, HE this is via the MASN.

Student Records

key to this stage of the process is recording info via MIU (management information unit) for all enrolments, and then attendance reporting etc .. again driven by FEFC funding rules, process is basically good but "not 100% efficient".

Registers are kept for both HE and FE students, more complex and more important in the latter case.

Although central record is key for funding etc, do maintain paper records within the section for completeness and as a cross-check.

Section Financial Arrangements

the internal allocations are tied not just to the actual volume of students but also to the type of teaching (& relative costs) undertaken. Some budget elements are broken down to Programme Leaders and some kept as a section 'pot'. The process is quite open and "not kept secret".

Question:	What are the main aspects of the College's information/decision aiding systems?					
	Elements					
Constructs	Funding Councils	MIU Systems eg Student Records, Registers, CovTec	Business Planning within Section	Strategic Planning within Institute	Committee Structures eg College Board etc	Scale (5-1)
Is this part of the External Environment?	5	2	4	5	4	Yes-No
Is the information essentially numerical?	4	5	3	3	1	Yes_no
Is this used mainly as a source of information?	3	5	4	2	2	Yes-No

Dix
Repertory Grid

Dix
Questionnaire
Response

Name:

Extent to which individual grids match own response to the question?

Grid No:	Totally Disagree		Neither Agree nor Disagree		Totally Agree
1				✓	✓
2					✓
3				✓	
4			✓		
5				✓	
6					✓
7				✓	
8				✓	
9					✓
10					✓

To what extent do you agree with the Institute's Resource Allocation Process?

Totally Disagree		Neither Agree nor Disagree		Totally Agree
			✓	

To what extent do you agree with the Institute's Resource Allocation Decisions?

Totally Disagree		Neither Agree nor Disagree		Totally Agree
			✓	

Interview with _____ transcript of written notes

Held 22/7/97, 10-12.45

General notes: 1st interview, Manager,

Information Systems in Use

Main system is a student record package purchased some 4 years ago from CovTec designed to allow tracking (principally) of FE students through enrolment to examination and leaving the college.

This is supplemented by an internal financial package (Dolphin), a personnel system (Percom) and a staff development record system (SDMSS). The payroll function has been left with the LEA. Finally non-central systems exist in various departments, some of these make use of downloads from the main COVTEC system.

Students enrolled on non-schedule II courses (ie non-fundable) are kept on a separate database.

These systems are networked, with a server on each of the 3 campuses, the files here are updated each day from the central record, originally only 10 site-licences for COVTEC were held, now 250.

Some separate systems maintained by the HE registry, produced initially by giving a lecturer time to write the software, this has been in use since Feb 97. Given the balance of the colleges work to FE, then the basic approach needed by FEFC is followed. However, COVTEC also covers the HE students but with less detail than is required by the FEFC for the FE students.

The differences between HE and FE also occur in respect of keeping class registers. The HE registry is separate and the HE lecturers are not involved in enrolling their own students (as is the norm for FE). In the main lectures in the HE college are for larger bodies of students so staff are merely expected to record total number present. Nonetheless, there remains a need to maintain attendance records for welfare reasons related to poor attendance etc. Some sections (such as Media studies) claim to maintain their own registers so why should they use the central ones etc. There are also wider problems in that staff will make errors in coding the register which leads to input rejections and the register being returned, source of frustration to both staff and registry clerks.

Formal Analysis Tools

A report writing tool exists to query the COVTEC data, this covers both ad-hoc and standard reports.

Uses of Information

Two main internal purposes.

Funding models

This is done through a series of spreadsheets, seeking to predict volume of funding units (FE) from the raw data, these sheets are made available to HODs etc so they too can experiment and predict potential funding. Pragmatically the whole model is based around the needs of the FEFC.

Long term aim of making this process more automatic, instead of using the formal model as a first run at an appropriate allocation model.

Particular problems at the moment include identifying a suitable tool for handling service teaching where the staff teaching a unit are different to the unit which actually owns that particular module.

The model is being revised on the basis of feedback from Deans/HODs who are fairly active in identifying deficiencies or anomalies.

The model aggregates data into convenient blocks of funding and work, this can cause some problems as 'reality' is somewhat messier, possible cause of debate? Examples of this include determining just what is an academic staff FTE with the introduction of more flexible contracts and different teaching years.

This aggregation is also reflected in basing the model on 'courses', but as the college has made its teaching more flexible in response to student needs this has become a less clear-cut apportionment.

Both HEFCE and FEFC allocate Institutional block grants rather than funding per student per se, this then needs to be broken down using the 'courses' as the main resource allocation tool. This in turn generates the budgets for the sections. To meet their targets, section heads and course leaders were now not just setting intake targets but also trying to estimate likely 'retention rates', however, practically these needed to be aggregated but for example 10 students could be in term 1, 15 in term 2, but of these maybe 7 were new. Particularly important as the basic algorithm was based around 'courses' of 3 terms.

Within the college this funding mechanism is accepted but is complicated by FEFC rules for allocating funding at the start, end and various progress points in between for a given student. With these rules the actual student count for the return must be accurate.

The other main area of difficulty rests with calculating staff hours and % use of the available time, will need to feed in up to 30 new 'calenders' to capture the various contractual and term length variables. May need to have to know teaching pattern of each individual member of staff.

Performance reviews

This process was originally annual, now carried out twice yearly in the late Autumn and Feb/March. Planned to expand to include a year end review each September.

To assist this some additional software has been purchased which calculates the volume of funding units and links with COVTEC, an aim of the end-year review will be to compare achieved with planned units.

Before the system was implemented there was some fear of its intentions ('catching-out' etc), now accepted if not loved. Is used for more than just numerical analysis, very much a chance to raise wider issues of concern, perhaps to an individual section.

They are also a key part of the process under-pinning the generation of the college's Business Plan. Given the nature of FE it is often hard to make accurate predictions of enrolments in the following sept, so once these are known income is re-allocated to reflect actual pattern of enrolment.

To allow this budgetary flexibility, units are expected to keep their fixed staff costs within certain % bands, variances outside this are closely scrutinised.

Question:	What are the main aspects of the College's information/decision aiding systems?									
	Elements									
Constructs:	COVTEC	HE Registry	Class Registers	Internal Spreadsheets	Performance Reviews	Business Planning Process	MASN	FEFC Funding Rules	Proportion of income spent on staff costs	Scale (5-1)
Does this affect primarily HE or FE work?	3	5	2	3	3	3	5	2	3	HE - FE
Are these an internal or external factor for the Institute	4	4	5	5	5	3	1	1	4	Internal - External
Is this element primarily based on IT systems	5	3	1	5	3	3	1	1	3	Yes-No
Is this used to review actual performance?	2	1	2	4	5	4	1	1	5	Yes _ No
Is this source of information widely accepted within the Institute	4	3	4	4	4	4	3	3	4	Yes - No
Does this measure current activity or future intentions?	5	4	5	3	3	1	2	2	2	Current - Future

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Table 1 Agreement with own as opposed to other Repertory Grids

Respondent	Agree with own grid		Agree with other grids								
ii	4		4	3	4	3	3	3	4	3	4
iii	4		4	4	3	5	3	4	3	4	5
iv	5		4	3	4	2	3	4	4	3	4
v	5		4	5	3	4	2	3	3	5	3
vi	4		1	4	3	4	2	2	3	3	4
vii	5		5	5	5	5	3	5	5	5	5
viii	5		3	4	4	4	4	3	4	3	4
ix	5		4	5	4	3	4	5	4	4	5
t-Test: Two-Sample Assuming Equal Variances											
	<i>Self</i>	<i>Others</i>									
Mean	4.63	3.74									
Variance	0.27	0.82									
Observations	8.00	72.00									
Pooled Variance	0.77										
df	78.00										
t	2.72										
P(T<=t) one-tail	0.00										
t Critical one-tail	1.66										

Table 2 Testing for Variances in Complexity of Repertory Grids

t-Test: Two-Sample Assuming Equal Variances				
	<i>FE Staff</i>	<i>HE Staff</i>	<i>HOD, Lect</i>	<i>Dean, Admin</i>
Mean	5.00	5.00	4.20	7.33
Variance	8.00	6.00	1.20	2.33
Observations	2.00	5.00	5.00	3.00
Pooled Variance	6.40		1.58	
Hypothesized Mean Difference	0.00		0.00	
df	5.00		6.00	
t	0.00		-3.42	
P(T<=t) one-tail	0.50		0.01	
t Critical one-tail	2.02		1.94	
P(T<=t) two-tail	1.00		0.01	
t Critical two-tail	2.57		2.45	

Table 3 Agreement in Terms of Organisational Role with the value of the Decision Aid

Respondent:	Org Role	Question Number:		Agree with:	Q11		Q12	
		11	12		HE	FE	HE	FE
ii	HE	3	3					
v	HE	4	4	Mean	3.20	3.50	3.00	4.00
vi	HE	3	2	Variance	0.70	0.50	1.00	2.00
viii	HE	2	2	Observations	5.00	2.00	5.00	2.00
ix	HE	4	4	Pooled Variance	0.66		1.20	
iv	FE	4	5	df	5.00		5.00	
vii	FE	3	3	t	-0.44		-1.09	
				P(T<=t) two-tail	0.68		0.32	
				t Critical two-tail	2.57		2.57	

Table 4 Agreement with representations between functional areas

Respondent:	Org Role	Question Number:				HE	HE	FE	FE	FE
		HE	HE	HE	HE					
ii	HE	4	3	3	4	3	4	4	4	3
v	HE	5	5	2	3	5	4	4	4	3
vi	HE	4	2	4	3	3	1	4	4	2
viii	HE	4	4	3	5	3	3	4	4	4
ix	HE	5	4	5	4	5	4	3	4	4
i	FE									
iv	FE	3	2	3	4	3	4	5	4	4
vii	FE	5	3	5	5	5	5	5	5	5
Agree HE staff		Agree FE staff								
	he/he	he/fe	fe/fe	fe/he						
Mean	3.80	3.50	4.67	3.80						
Variance	0.92	0.50	0.27	1.29						
Observations	25.00	10.00	6.00	10.00						
Pooled Variance	0.80		0.92							
df	33.00		14.00							
t	0.89		1.75							
P(T<=t) one-tail	0.19		0.05							
t Critical one-tail	1.69		1.76							

Table 5: Agreement in terms of managerial role

Agreement with others in own group		
	<i>Own Group</i>	<i>Others</i>
Mean	3.90	3.74
Variance	1.02	0.63
Observations	42.00	38.00
Pooled Variance	0.83	
df	78.00	
t	0.82	
P(T<=t) one-tail	0.21	
t Critical one-tail	1.66	
Agreement with Senior Staff		
	<i>Snr Staff</i>	<i>Rest</i>
Mean	3.92	3.85
Variance	0.99	0.66
Observations	12.00	20.00
Pooled Variance	0.78	
df	30.00	
t	0.21	
P(T<=t) one-tail	0.42	
t Critical one-tail	1.70	

Table 6: Agreement with overall process and outcomes

Agreement with Dec Aiding Process		
	<i>Snr Staff</i>	<i>Rest</i>
Mean	4.00	3.00
Variance	0.00	0.50
Observations	3.00	5.00
Pooled Variance	0.33	
df	6.00	
t	2.37	
P(T<=t) one-tail	0.03	
t Critical one-tail	1.94	
Agreement with Decision Outcomes		
	<i>Snr Staff</i>	<i>Rest</i>
Mean	4.33	2.80
Variance	0.33	0.70
Observations	3.00	5.00
Pooled Variance	0.58	
df	6.00	
t	2.76	
P(T<=t) one-tail	0.02	
t Critical one-tail	1.94	

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*Response to first draft
of chapter six*

6 March 1998

Dear Roger

Thank you for the draft of the chapter of your thesis on Warrington. I apologise for the delay in responding but as you know, work intrudes on these pleasures. I found the chapter both interesting and recognisable as our institution. I have no problems with any of its contents - indeed I might use its conclusions and commentary to good effect!

I trust all is well with you. May I wish you a speedy and successful conclusion to your research. I am pleased that we were able to help.

Best wishes.

Yours sincerely,
/

Dean

MR/mw



Principal and Chief Executive: Hilary Tucker M. Litt.
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